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SPECIAL ISSUE CONTAINING PRELIMINARY ANNOUNCEMENTS OF THE FIFTH PHILADELPHIA MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES, DECEMBER 27, 1926, TO JANUARY 1, 1927. EDITED BY BURTON E. LIVINGSTON, PERMANENT SECRETARY.

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VOL. LXIV, No. 1666

FRIDAY, DECEMBER 3, 1926

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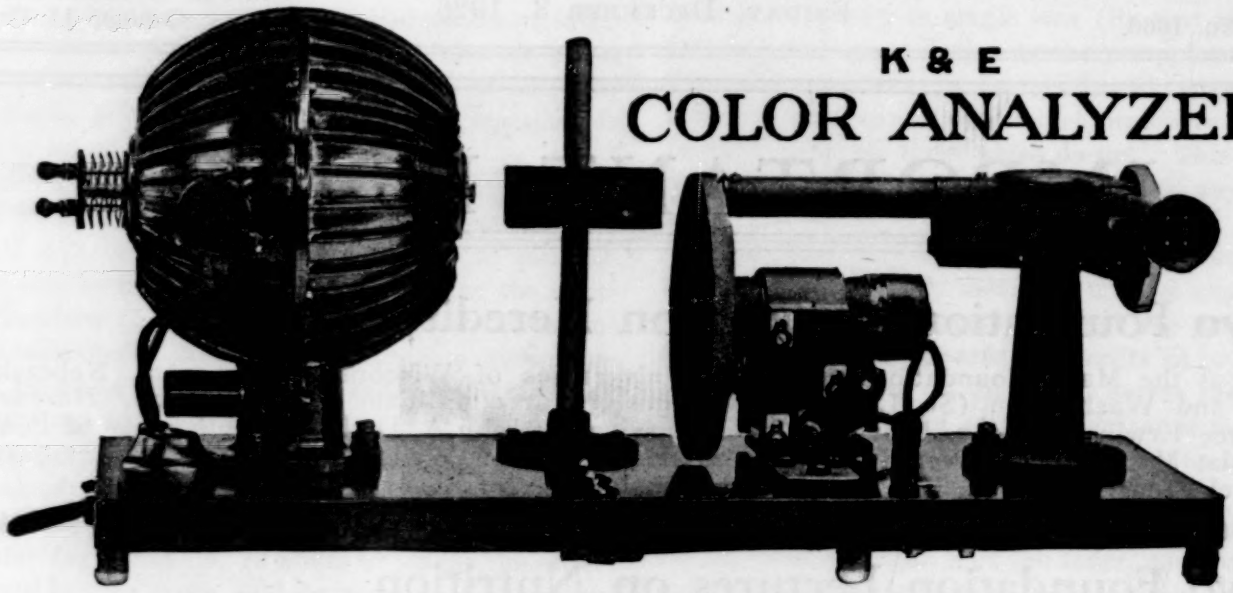

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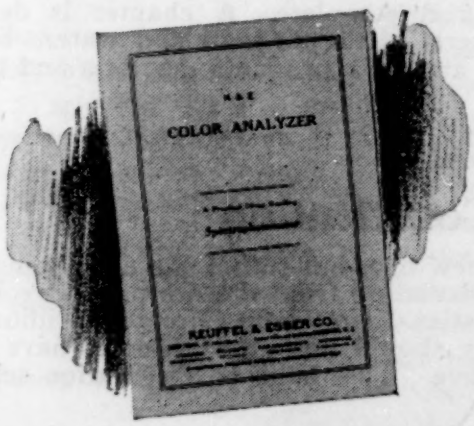

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SCIENCE

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PRELIMINARY ANNOUNCEMENT OF THE FIFTH PHILADELPHIA MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

INTRODUCTION

THIS special issue of SCIENCE is sent to all members of the American Association, to those who regularly receive *The Scientific Monthly* as well as to those regularly receiving SCIENCE, in order that the preliminary announcements of the approaching fifth Philadelphia meeting may reach every member. The announcements contain as much information about the Philadelphia meeting as could be brought together at the time this issue went to press. The complete general program of the meeting will be distributed to all who register in the registration offices at Philadelphia, which will open at 9 on Monday, December 27, and will be open until 6. The office hours will be the same on the following days of the meeting. The registration offices will be in the same hall with the annual science exhibition, Weightman Hall, the gymnasium of the University of Pennsylvania, at 33rd and Spruce Streets. Members who have paid dues

Those planning to attend the fifth Philadelphia meeting should arrange for their hotel rooms at once. A list of Philadelphia hotels, with prices, has been published in SCIENCE for November 12.

Those who are to present papers at the meeting, whether they are members of the association or not, should send their manuscripts to the association news service as soon as possible, sending an additional copy of each paper to Science Service and a third copy to the society or section secretary in whose program the paper is to occur.

When purchasing railway tickets to Philadelphia, each purchaser should be sure to secure from the ticket agent a certificate for the meeting of the American Association for the Advancement of Science and Associated Societies, unless a round-trip ticket is purchased. After validation at the meeting, the certificate will entitle the holder to a half-fare rate for the return trip.

for the current year and who do not attend the meeting may receive the general program gratis if they send their requests for it to the Washington office of the association, in the Smithsonian Institution Building. Such requests should arrive by December 22; if received later, they can not be cared for till after the close of the meeting.

The importance of the annual science convention is being more generally appreciated each year, the membership rolls of the association and the associated scientific societies are being rapidly augmented, and the number of men and women of science who attend the annual meetings is correspondingly increasing. The Philadelphia meeting will surely be attended by a much larger number than were present at the Kansas City meeting last year, and it may rival in attendance the Washington meeting of the year before. Thirty-nine scientific organizations are planning to meet with the association at Philadelphia.

This meeting will be held under the presidency of Dr. L. H. Bailey, eminent systematic botanist, productive student of difficult plant families like the sedges and the palms, editor of our most useful books of reference on cultivated plants, and author or editor of numerous other volumes on nature and on rural life. Dr. Bailey was president of the International Congress of Plant Sciences, held last August in Ithaca, N. Y., and he holds the presidency of the Botanical Society of America. The retiring president of the association is this year Dr. Michael I. Pupin, of Columbia University, widely known for his physical discoveries and inventions, as well as for his autobiography, "From Immigrant to Inventor," which has been read by almost every student of American science. Dr. Pupin will deliver the address of the retiring president on the evening of Monday, December 27, at the opening of the meeting. The subject of his address will be "Fifty Years' Progress in Electrical Communication."

The fifth Philadelphia meeting will be the eighty-third meeting of the association. Earlier meetings in the Quaker City, exceptionally successful in every case, have occurred in September, 1848 (the first meeting of the association, at which its organization was completed); in September, 1884 (the thirty-third meeting); in December, 1904 (the fifty-fourth meeting and the third after the season of the annual meeting was changed from summer to winter); and in December, 1914 (the sixty-sixth meeting). At this time, when the association is again returning to the place of its birth, it is interesting to recall the names of the presidents who presided at the earlier Philadelphia meetings and of the retiring presidents who gave the main addresses on those occasions. These are as follows:

First Philadelphia meeting, September, 1848.—William B. Rogers acted as president until the election of W. C. Redfield, who presided throughout the latter part of the meeting.

Second Philadelphia meeting, September, 1884.—J. P. Lesley presided and C. A. Young gave the retiring presidential address, on "Pending Problems in Astronomy."

Third Philadelphia meeting, December, 1904.—W. G. Farlow presided and Carroll D. Wright gave the retiring presidential address, on "Science and Economics."

Fourth Philadelphia meeting, December, 1914.—Charles W. Eliot presided and the retiring presidential address was given by Edmund B. Wilson, on "Some Aspects of Progress in Modern Zoology."

LOCAL COMMITTEES AND LOCAL REPRESENTATIVES OF SECTIONS FOR THE FIFTH PHILADELPHIA MEETING

LOCAL COMMITTEE ON ARRANGEMENTS

C. E. McClung, *chairman;* professor of zoology and director of the laboratory, University of Pennsylvania.

Samuel W. Fernberger, *secretary;* assistant professor of psychology, University of Pennsylvania.

W. H. DuBarry; assistant to the president, University of Pennsylvania.

G. H. Hallett; professor of mathematics, University of Pennsylvania.

G. E. Nitzsche; recorder, University of Pennsylvania.

Reese James; professor of English, University of Pennsylvania.

W. T. Taggart; professor of chemistry, University of Pennsylvania.

Thomas Hart; director of Houston Hall, University of Pennsylvania.

Arthur W. Goodspeed (representing the American Philosophical Society); professor of physics and director of the laboratory, University of Pennsylvania.

T. Chalkley Palmer (representing the Academy of Natural Sciences); director of the Academy of Natural Sciences.

Howard McClenahan (representing the Franklin Institute); secretary of the Franklin Institute.

George Wheeler (representing the Philadelphia Public Schools); assistant superintendent, Philadelphia Public Schools.

CHAIRMEN OF SUBCOMMITTEES

Finance: W. H. DuBarry.
Meeting Places: G. H. Hallett.
Hotels and Housing: G. E. Nitzsche.
Publicity: Reese James.
Exhibition: W. T. Taggart.
Transportation: Thomas Hart.
Entertainment: G. E. Nitzsche.

LOCAL REPRESENTATIVES FOR SECTIONS OF THE ASSOCIATION AND RELATED SOCIETIES

Section A (Mathematics): George G. Chambers.
Section B (Physics): Arthur W. Goodspeed.

Section C (Chemistry): Walter T. Taggart.
Section D (Astronomy): Samuel G. Barton.
Section E (Geology and Geography): Frederick Ehrenfeld.
Section F (Zoological Sciences): D. H. Wenrich.
Section G (Botanical Sciences): Rodney H. True.
Section H (Anthropology): Frank G. Speck.
Section I (Psychology): Edwin B. Twitmyer.
Section K (Social and Economic Sciences): James P. Lichtenberger.
Section L (Historical and Philological Sciences): Arthur C. Howland.
Section M (Engineering): Robert H. Fernald.
Section N (Medical Sciences): Wm. Pepper.
Section O (Agriculture): John W. Harshberger.
Section Q (Education): James C. Miller.
Societies not specially related to any single section: Samuel W. Fernberger.

All correspondence for the local committee or any of its members, concerning local arrangements for the meeting, should be addressed to the general chairman, Dr. C. E. McClung, Zoological Building, University of Pennsylvania, Philadelphia. Local representatives for sections may be addressed individually at the University of Pennsylvania.

OFFICERS OF THE ASSOCIATION FOR THE CALENDAR YEAR 1926, INCLUDING THE FIFTH PHILADELPHIA MEETING

President

L. H. Bailey, 103 Sage Place, Ithaca, N. Y.

Retiring President

M. I. Pupin, Columbia University, New York City.

Vice-Presidents,[1] *Retiring Vice-Presidents and Secretaries of the Sections*

Section A (Mathematics):
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Retiring Vice-president, W. H. Roever, Washington University, St. Louis, Mo.
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Secretary, A. L. Hughes, Washington University, St. Louis, Mo.

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Retiring Vice-president, H. B. Cady, University of Kansas, Lawrence, Kans.
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Vice-president, Robert G. Aitken, Lick Observatory, Mt. Hamilton, Calif.
Retiring Vice-president, A. E. Douglass, University of Arizona, Tucson, Ariz.
Secretary, Philip Fox, Northwestern University, Evanston, Ill.

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Retiring Vice-president, R. A. Daly, Harvard University, Cambridge, Mass.
Secretary, G. R. Mansfield, U. S. Geological Survey, Washington, D. C.

Section F (Zoological Sciences):
Vice-president, Winterton C. Curtis, University of Missouri, Columbia, Mo.
Retiring Vice-president, H. S. Jennings, Johns Hopkins University, Baltimore, Md.
Secretary, Geo. T. Hargitt, Syracuse University, Syracuse, N. Y.

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Retiring Vice-president, Robert B. Wylie, University of Iowa, Iowa City, Iowa.
Secretary, Sam F. Trelease, Columbia University, New York City.

Section H (Anthropology):
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Retiring vice-president, C. B. Davenport, Station for Experimental Evolution, Cold Spring Harbor, N. Y.
Secretary, R. J. Terry, Washington University School of Medicine, St. Louis, Mo.

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Secretary, Frank N. Freeman, University of Chicago, Chicago, Ill.

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Retiring Vice-president, F. R. Fairchild, Yale University, New Haven, Conn.
Secretary, Frederick L. Hoffman, Babson Institute, Babson Park, Mass.

Section L (Historical and Philological Sciences):[2]
Vice-president, W. Carl Rufus, University of Michigan, Ann Arbor, Mich.

[1] Vice-presidents are elected for a term of one year, from the close of one annual meeting to the close of the next following one.

[2] Section L has not yet been wholly organized. The recently affiliated History of Science Society represents a part of the history portion of this section. The recently organized and affiliated Linguistic Society of America was asked to take charge of programs on linguistics, but no program in this field will be presented this year, since that society meets elsewhere.

Retiring Vice-president, W. A. Oldfather, University of Illinois, Urbana, Ill.

Secretary, Frederick E. Brasch, Library of Congress, Washington, D. C.

Section M (Engineering):

Vice-president, C. R. Richards, Lehigh University, Bethlehem, Pa.

Retiring Vice-president, C. R. Richards, Lehigh University, Bethlehem, Pa.

Secretary, N. H. Heck, U. S. Coast and Geodetic Survey, Washington, D. C.

Section N (Medical Sciences):

Vice-president, Rufus I. Cole, Rockefeller Hospital, New York City.

Retiring Vice-president, A. J. Carlson, University of Chicago, Chicago, Ill.

Secretary, A. J. Goldforb, College of the City of New York, New York City.

Section O (Agriculture):

Vice-president, C. F. Marbut, U. S. Department of Agriculture, Washington, D. C.

Retiring Vice-president, C. V. Piper, *deceased.*

Secretary, P. E. Brown, Iowa State College, Ames, Iowa.

Section Q (Education):

Vice-president, Melvin E. Haggerty, University of Minnesota, Minneapolis, Minn.

Retiring Vice-president, Otis W. Caldwell, Columbia University, New York City.

Secretary, A. S. Barr, University of Wisconsin, Madison, Wis.

Permanent Secretary[3]

Burton E. Livingston, Johns Hopkins University, Baltimore, Md. (Association mail address: Smithsonian Institution Building, Washington, D. C.)

General Secretary[3]

W. J. Humphreys, U. S. Weather Bureau, Washington, D. C.

Treasurer[3]

John L. Wirt, Carnegie Institution of Washington, Washington, D. C.

Secretary of the Council and Program Editor

Sam F. Trelease, Columbia University, New York City.

Executive Assistant

Sam Woodley, Smithsonian Institution Building, Washington, D. C.

Auditor

R. B. Sosman, Geophysical Laboratory, Washington, D. C.

[3] The permanent secretary, the general secretary and the treasurer are each elected for a term of four years; their terms of office expire at the end of the fifth New York meeting.

Members of the Executive Committee of the Council for the Calendar Year 1926[4]

J. McK. Cattell (1926), chairman, Garrison-on-Hudson, N. Y.

L. H. Bailey, president of the association (1926).

Burton E. Livingston, permanent secretary (1928).

W. J. Humphreys, general secretary (1928).

Herman L. Fairchild (1927), University of Rochester, Rochester, N. Y.

Vernon Kellogg (1928), National Research Council, Washington, D. C.

F. R. Moulton (1929), University of Chicago, Chicago, Ill.

W. A. Noyes (1927), University of Illinois, Urbana, Ill.

M. I. Pupin (1929), Columbia University, New York City.

Henry B. Ward (1926), University of Illinois, Urbana, Ill.

Edwin B. Wilson (1928), Harvard School of Public Health, Boston, Mass.

HOSTS FOR THE MEETING

The University of Pennsylvania is acting with the American Philosophical Society and the Franklin Institute, as hosts for this meeting. Those in attendance are invited to visit the rooms of the Philosophical Society, in Independence Hall, and those of the Franklin Institute. Most of the sessions are to be held in the buildings of the University of Pennsylvania, which will provide amply and admirably for the many simultaneous meetings of our convention. The Drexel Institute is to contribute the use of its auditorium, Drexel Hall. For the excellent preliminary arrangements the thanks of those who attend will be due specially to Dr. C. E. McClung and the other members of the local committees. Dr. Samuel W. Fernberger, secretary of the local committee on arrangements, has looked after the many details of the preparations with great efficiency and geniality.

THE FOURTH PRIZE AWARD

The fourth American Association Prize will be awarded at the fifth Philadelphia meeting. This has been noted in SCIENCE for November 26, where details concerning the prize may be found. The prize is given each year to the author of one of the outstanding contributions to science presented in the program of the meeting, without reference to whether the recipient is a member of our organization or not. There is no competition and no submitting of papers. Each section secretary, as well as the secretary of each organization meeting with the association at this meeting, is asked to make nominations for this purpose and the Committee on Prize Award will select

[4] The number in parentheses denotes the calendar year at the end of which the member's term of office expires.

the winner from the list of nominations thus secured. The name of the winner will be made known at the close of the meeting. The Committee on Award has the following members:

C. E. Seashore, chairman; University of Iowa, Iowa City, Iowa.
Otis W. Caldwell; Lincoln School, Columbia University, New York City.
C. B. Davenport; Station for Experimental Evolution, Cold Spring Harbor, Long Island, N. Y.
Lauder W. Jones; Princeton University, Princeton, N. J.
C. F. Marbut; Bureau of Soils, U. S. Department of Agriculture, Washington, D. C.

MEETING PLACES

Most of the sessions of the Philadelphia meeting will be held in the buildings of the University of Pennsylvania, and the American Association greatly appreciates the cordially helpful and cooperative action of the authorities of the university, who are, through the local committee on arrangements, placing many of the university halls at the disposal of the association and its associated organizations for the period of the meeting. A few of the associated societies will hold sessions in hotels or other places outside of the university, as is mentioned below in some cases or as will be shown in the general program of the meeting.

GENERAL SESSIONS AND NON-TECHNICAL LECTURES

GENERAL SESSIONS

At the opening session of the meeting, in Drexel Hall on the evening of Monday, December 27, at 8:15, will be delivered Retiring President M. I. Pupin's address, on "Fifty Years' Progress in Electrical Communication." This should be heard by all who are interested in science. It will be followed by a general reception (in Houston Hall) to those who attend the meeting, given by the local committee and the host institutions.

On Tuesday afternoon at 2:30 a general session of the association will be devoted to certain phases of the work of the American Association's Committee of One Hundred on Scientific Research, Dr. Rodney H. True, *secretary*. This program is being arranged under the auspices of the Committee on Research in Educational Institutions, one of the subcommittees of the Committee of One Hundred. It is in charge of Dr. Maynard M. Metcalf, of the Johns Hopkins University, secretary of the subcommittee, who has been engaged in a study of the problem of research in colleges, not only with the subcommittee but also in connection with the work of the National Research Council. The general subject of this program will be "Research, especially in Colleges and Professional Schools." The following papers will be presented: "Research as representing an Attitude of Mind," by Dr. John C. Merriam, of the Carnegie Institution of Washington. "Research in Medical Schools," by Dr. Florence R. Sabin, of the Rockefeller Institute for Medical Research. "Research in Jurisprudence," by Professor Walter W. Cook, of the Yale Law School and the Johns Hopkins University. Research in Colleges—Suggestions from Several Conferences," by Dr. Maynard M. Metcalf, of the Johns Hopkins University. "Research in Colleges—Experiences in One College," by Professor H. B. Goodrich, of the Connecticut Wesleyan University. There will be informal discussions from the floor.

Another general session on Tuesday afternoon, at 4:30, probably in Drexel Hall, will be devoted to the Fourth Annual Josiah Willard Gibbs Lecture, by Dr. H. B. Williams, professor of physiology in the College of Physicians and Surgeons of Columbia University. Dr. Williams will speak on "Mathematics and the Biological Sciences," a very timely topic, as most biologists and many mathematicians are aware. The Josiah Willard Gibbs Lecture is a regular annual occurrence under the auspices of the American Mathematical Society. This afternoon session will be held jointly by the Mathematical Society and the American Association.

On Tuesday evening the Fifth Annual Sigma Xi Lecture will be given in Drexel Hall, by a speaker whose name is to be announced later. The society unites with the association in this general session.

A general session on Wednesday afternoon (room 201, Bennett Hall) at 2:30 is planned for a special program and conference on "Hydrobiology." This is being arranged under the joint auspices of the Committee on Aquiculture of the Division of Biology and Agriculture of the National Research Council, and the Circle of Cooperating Hydrobiologists. Professor Stephen A. Forbes, of the University of Illinois, will read a paper on "Fundamental Features and Possible Improvement of the Yield of a River System." Professor Charles Juday, of the University of Wisconsin, will read a paper on "The Productivity of Wisconsin Lakes." A paper will be read by Professor A. G. Huntsman, of the University of Toronto, on "Limiting Factors," and Dr. Albert Mann, of the Carnegie Institution of Washington, will read a paper on "Bottom Diatoms, their Great Value and Possible Increase."

The general session of Wednesday evening (at 8:15, in Drexel Hall) will be of specially broad interest, unusually attractive to all other intellectual workers as well as to those interested in science and its development in the world. On this occasion the

association is exceptionally fortunate in having been able to secure an illustrated lecture on "Cambridge University," to be given by the eminent British biologist, Dr. George H. F. Nuttall, director of the Molteno Institute for Research in Parasitology, Cambridge University, Cambridge, England.

On Thursday afternoon of convocation week, at 4:30, in Drexel Hall, will occur a general session that will be of great fundamental interest to all students and workers in every field of science and for the public as well. Dr. Heber D. Curtis, eminent astronomer, director of the Allegheny Observatory, of Pittsburgh, Pa., will deliver an illustrated lecture on "The Unity of the Universe."

The general session of Thursday evening will be of great general interest, and of special interest to students of geography and anthropology. On this occasion the American Association will fortunately be unusually honored in having as lecturer the general secretary of the British Association for the Advancement of Science, Dr. J. L. Myres, who is to give an illustrated lecture on "Geographic Conditions of Ancient Greek Culture." It seldom happens that the British Association is represented by one of its general officers at one of our meetings. Dr. Myres's presence and his lecture are an illustration of the cordial relations between the British and the American organizations for the advancement of science.

NON-TECHNICAL LECTURES

Arrangements are in an advanced state of progress for a series of public and non-technical presentations of illustrated lectures and demonstrations of science topics for the people of Philadelphia, some of them specially prepared for students in the schools. It is recently becoming more and more thoroughly recognized that the truths of science and an appreciation of the scientific method of thought and research and of the basic principles and standards of scientific scholarship need to be presented at every opportunity to the general public and especially to adolescents. A plan has recently been developed by which the annual meetings of our association may be rendered more valuable in this respect, carrying a better appreciation of science to the people of the cities where our meetings are held and especially to the youth of those cities, who will be the active people of to-morrow. The excellent service given in recent years by the daily press, to the diffusion of scientific knowledge in general and to the annual meetings of the American Association in particular, assures a very wide influence beyond the audiences at the presentations themselves. The general program will give details of these non-technical lectures and demonstrations.

THE ANNUAL SCIENCE EXHIBITION

The American Association exhibition of scientific apparatus and methods, recent results of research and new publications on science subjects will be a very important feature of the fifth Philadelphia meeting. The exhibits will be partly by manufacturers and publishers and by dealers in scientific instruments, materials, etc., and partly by individual research workers and institutions. The latter group of exhibits will be mainly by invitation. Individuals who wish to exhibit newly developed apparatus and methods, or the results of recent research, will be accommodated as far as possible. Exhibitions will be held by a number of the science societies that meet with the association at Philadelphia and large numbers of special individual exhibits will be shown in these. The general exhibition will be housed in the great hall of the gymnasium of the University of Pennsylvania (Weightman Hall, 33rd and Spruce Streets) and the society exhibitions will be in rooms near those used for the scientific sessions of the respective societies. A catalogue of the general exhibition will be published and is to be available on Tuesday, the second day of the meeting, being printed on Monday night. Lists of exhibits in the society exhibitions will be included in the catalogue in so far as these can be secured in time. The association desires to be of as much service as possible, to make the society exhibitions a success in every way.

The general exhibition will be the social center of the convention. The hall will be appropriately decorated and the exhibits will be attractively arranged. The registration offices will occupy a central position in the exhibition hall, near the Christmas tree, and all who register will have occasion to visit the exhibition several times in the week of the meeting. Tea will be served there every afternoon. Two evening entertainments are being planned for the general exhibition this year, a Christmas-tree entertainment for Tuesday evening and a New-Year's-Eve entertainment for Friday evening. The general exhibition will be open daily from 9 to 6 and on the two special evenings until late. Those who attend evening sessions on these two evenings should visit the exhibition hall before retiring, even if the visit must be after 11, for the most interesting and amusing features of the entertainments will be placed near the end of the period. Statements about the annual science exhibition have been made in SCIENCE for November 19, page 491.

NEWS SERVICE AT THE PHILADELPHIA MEETING

The news service is this year in charge of Austin H. Clark, of the U. S. National Museum, who was chairman of the publicity committee at the recent

Washington meeting. Mr. Clark is the director of news for the American Association. The association news service will again have the cooperation of Science Service, which will furnish news of the meeting to a series of dailies that have already arranged for this. It will be remembered that Science Service has offices in the National Academy Building, Washington, D. C., that it was organized to supply reliable science news to daily papers, that it is the publisher of the *Science News-Letter,* and that the American Association is officially represented by three members on its board of directors. In addition, several other news organizations and a number of the great dailies will have representatives at the Philadelphia meeting.

The purpose of the American Association News Service, under the direction of Mr. Clark, is to supply press representatives freely with just as full and just as usable information as is possible, and to have this ready for use before the date of release. This can be accomplished only in so far as those who are planning to give papers or deliver addresses at the meeting will send their manuscripts, or at least abstracts thereof, to the director of news some time before the opening of the meeting. These manuscripts should each show the name of the organization before which the paper is to be presented, with information as to the date of presentation, as nearly as the latter can be given; at the top of the manuscript write, "Paper to be presented before the ——— (name) Society at its session on ——— (date)." Manuscripts for the news service should be sent to Mr. Clark, at the Washington office of the association, in the Smithsonian Institution Building. It needs to be emphasized that the efficiency of our news service will depend on the early sending of manuscripts by the authors; the material must be worked over and prepared for use by the representatives of the press and the greater part of this work must be done in Washington, before the meeting opens. The same applies to the working over of manuscripts by the staff of Science Service. *Prepare manuscripts in triplicate and send one copy to Mr. Clark, a second to Science Service and a third to the secretary of the society or section concerned.*

The material prepared by our news service will be freely available to the press representatives, marked for release only at the proper time, on the day of presentation of the paper in each case. The daily press is now the strongest ally of the association, in its efforts to cultivate and extend an appreciation of science and research among intelligent people. The news service will try to bring authors of important papers into touch with the press representatives, for interviews, and the men and women of science who will be present at the Philadelphia meeting are asked to do all they can to facilitate the work of the newspaper men. Those who have news material are asked to cooperate with Mr. Clark, to the end that the news of the meeting may be consistently and efficiently released, and all press representatives and organizations are asked to cooperate in the same way.

SESSIONS OF SECTIONS AND SOCIETIES AT PHILADELPHIA

The several sections of the American Association and the many societies and other organizations that are to meet with the association this year will hold numerous sessions for reading of papers and delivering of addresses, by specialists and authorities in nearly all branches of science. A preliminary account of the programs that are being arranged, so far as the necessary information had been received from the secretaries when this account went to press, is given below. Full information will appear in the general program of the meeting, which will be available Monday morning when registration begins. The following account is arranged under headings that correspond to the sections of the association.

A. Mathematics.—The American Mathematical Society and the Mathematical Association of America will meet jointly with Section A of the A. A. A. S., on Thursday forenoon, December 30. Professor W. H. Roever, of Washington University, retiring vice-president for Section A, will deliver an address on "The Weight Field of Force of the Earth." Other addresses will include one by Professor F. D. Murnaghan, of the Johns Hopkins University, representing the Mathematical Association of America, on "The Duty of Exposition, with Special Reference to the Cauchy-Heaviside Theorem." The fourth annual Josiah Willard Gibbs lecture will be given under the joint auspices of the American Mathematical Society and the American Association, by Professor H. B. Williams, Dalton professor of physiology in Columbia University; the lecture will deal with applications of mathematics to physiology. The American Mathematical Society will hold its sessions for the reading and discussion of papers on Tuesday and Wednesday, December 28 and 29; Professor G. D. Birkhoff, research professor of mathematics in Harvard University, will deliver his retiring presidential address on "A Mathematical Critique of Some Physical Theories." The Mathematical Association of America will hold similar sessions on Thursday afternoon and Friday, December 30 and 31; addresses will be given by Mr. W. D. Lambert and Professors R. C. Archibald, D. R. Curtiss, E. R. Hedrick, E. V. Huntington, J. E. Rowe and F. M. Weida. The attention of those interested in mathematics is also drawn

to an address by Professor W. F. G. Swann, of Yale University, on "The New Quantum Dynamics," which will be given in connection with Section B (Physics). On Wednesday evening, December 29, an informal dinner for mathematicians and their guests will be held at the Aldine Hotel, 19th and Chestnut Sts.

B. Physics.—Section B will meet in association with the American Physical Society. The meetings will occupy three days, Monday to Wednesday, December 27 to 29. On Tuesday afternoon Professor H. M. Randall, of the University of Michigan, retiring vice-president for Section B, will deliver his official address on "Infra Red Spectroscopy." This will be followed by an address by Professor W. F. G. Swann, of Yale University, on "The New Quantum Dynamics." The attention of those interested in physics is directed to the address of Professor G. D. Birkhoff, of Harvard University, retiring president of the American Mathematical Society, which is entitled "A Mathematical Critique of Some Physical Theories." —The American Meteorological Society will hold its eighth annual meeting from December 30 to January 1. A symposium is planned on the meteorology of Greenland, a subject of great present interest. Mr. S. P. Fergesson, recently returned from Greenland, will lead the discussion. Results of renewed activity in the exploration of the upper air will be reported and the interesting subject of long-range weather forecasting will be discussed.

C. Chemistry.—Section C (Chemistry) is planning four half-day sessions, the papers all to be presented by speakers invited by the section committee. As far as possible, these will be scheduled to avoid conflicts with other sessions of interest to chemists. The address of the retiring vice-president for the section, Professor H. P. Cady, of the University of Kansas, will be given. Dr. S. E. Sheppard, of the Eastman Kodak Company, will discuss the sensitivity of photographic materials, and Dr. A. F. Lidbury will present a paper on the function of Section C in the association. It is hoped that the latter paper will lead to further discussion on the part of those present as to the kind of programs that seem most suitable for future meetings. Another feature of the program will be a half-day session on "Cosmic Chemistry." Dr. Henry N. Russell, Dr. George P. Merrill and Dr. W. J. Humphreys will discuss the chemistry of stars and meteors and of the air. Section C will join Section N for a session, on Tuesday forenoon, devoted to a discussion of "Growth and Development in Health and Disease," which will interest students of chemistry as related to physiology. (See under N, below.)

D. Astronomy.—The program on astronomical science will be in charge of the American Astronomical Society, with the exception of one session for the presentation of the address by Professor A. E. Douglass, the retiring vice-president for Section D. It is planned that this address will be presented at a joint meeting with Section B (Physics), at which time also will be presented the official address of Professor H. M. Randall, retiring vice-president for Section B, and an address by Professor W. F. G. Swann, on "The New Quantum Dynamics." A local committee, of which the chairman is Professor John A. Miller, of Swarthmore College, is arranging the program of the American Astronomical Society. A joint session will be held with Section D and plans are being made for one or more other sessions with kindred societies.

E. Geology and Geography.—Section E will hold its sessions at Philadelphia under the chairmanship of Dr. G. H. Ashley, state geologist of Pennsylvania, on December 28 to 30, in conjunction with the Association of American Geographers. A joint dinner is planned for Wednesday night, the 29th, to be followed by addresses by Professor J. Paul Goode, retiring president of the Association of Geographers, and Professor R. A. Daly, retiring vice-president for Section E. Professor Daly's subject is to be "Dynamical Geology since 1900." Those who plan to attend the dinner on Wednesday, December 29, are requested to notify the section secretary, Dr. G. R. Mansfield, U. S. Geological Survey, Washington, D. C., by December 22 if possible.—The annual meeting of the Association of American Geographers, from December 28 to 30, will include a joint session with the American Meteorological Society, on the afternoon of December 30. A field excursion is planned and also an evening round table. The annual meeting of the National Council of Geography Teachers will be held from December 27 to 29, the theme of the meeting being "Geography in the Curriculum." Sectional meetings, with clinics and round-table conferences, will be devoted to the elementary grades, junior and senior high-school grades, and teacher-training institutions. The clinics will be conducted for two days, the same group of pupils being used in each section by the same instructor. Round-table topics will deal with: (1) the selection of geographical subject-matter and the determination of essential outcomes of geography lessons in terms of geographic facts and principles and attitudes of mind; (2) guiding principles in choosing worthwhile geographic materials—specimens, pictures, maps, graphs, etc.; (3) analysis and discussion of units of work successfully developed with pupils other than those used for the clinics. Reports of committees on elementary grades and junior and senior high-school grades will be presented and discussed, recent investigations in the general field of geography teaching will be presented and the president's address will be

given, on "Problems demanding Immediate Attention." There will be a geography dinner, followed by an address on a recent world tour. There will also be exhibits of materials for geography lessons in school grades and colleges, together with work done by pupils assembled here for observation and analysis. Special excursions will be conducted to points of special interest.—The American Alpine Club will meet on Wednesday, December 29. A business meeting is scheduled for 2:30, to be followed by several illustrated talks on recent climbs and expeditions. The annual dinner will occur in the evening, at the Bellevue-Stratford Hotel, with illustrated accounts of mountain experiences.

F. Zoological Sciences.—A program covering Monday, Tuesday and Wednesday, December 27 to 29, will be jointly sponsored by the American Society of Zoologists, the American Society of Naturalists, and Section F of the A. A. A. S. Programs for presentation of papers will be conducted by the American Society of Zoologists. Sessions for the reading of papers will be held on Monday, Tuesday and Wednesday mornings. Joint sessions with the Ecological Society of America and the American Society of Parasitologists are being arranged. This year the presentation of papers by laboratory demonstration or exhibit is being stressed, and it is planned to set aside all Monday afternoon and a part of Tuesday afternoon, exclusively, for this informal laboratory program. The business meeting of the American Society of Zoologists will be held on Tuesday afternoon. On Tuesday evening a dinner, to which all zoologists are invited, will be held under the auspices of Section F. A short business session will follow the dinner, after which the retiring vice-president for the section, Dr. H. S. Jennings, will deliver his official address.—The Entomological Society of America will hold morning and afternoon sessions Tuesday and Wednesday, December 28 and 29, under the presidency of Dr. W. A. Riley. A symposium on "Needed Lines of Investigation in American Entomology" will be held Tuesday afternoon. A feature of the program will be the annual public address of the society, to be delivered this year by Dr. George H. F. Nuttall, director of the Molteno Institute for Research in Parasitology, Cambridge University, Cambridge, England. The usual exhibits of specimens, apparatus and methods will be displayed.—The American Association of Economic Entomologists will hold its thirty-ninth annual meeting December 28 to January 1. The Section of Plant Quarantine and Inspection will meet Tuesday, the Section of Apiculture will hold two sessions on Wednesday and the general association will hold a business session Wednesday morning. On Thursday morning, President Arthur Gibson, chief of the Entomological Branch, Ottawa, Canada, will deliver his official address. The program will continue Thursday and Friday and will be concluded Saturday morning, with a final business session. There will be exhibits of equipment, results of research, etc. The entomologists' dinner will be held Friday evening.

G. Botanical Sciences.—On Tuesday afternoon, December 28, Section G will hold a joint session with the several botanical societies, when Professor R. B. Wylie, of the University of Iowa, retiring vice-president for Section G, will deliver an address on "Leaf Structure and Wound Response." This address will be followed by invitation papers by Dr. W. J. V. Osterhout, of the Rockefeller Institute for Medical Research, and Dr. F. D. Fromme, of the Virginia Agricultural Experiment Station. The Botanical Society of America will hold its annual meeting December 28 to 30, under the presidency of Dr. L. H. Bailey, who is also president of the American Association. Programs are being arranged for all sections and there will be joint sessions with Section G of the American Association, the Ecological Society of America and the American Phytopathological Society. The program of the Crop Protection Institute will interest many botanists. The annual dinner for all botanists will occur on Thursday, December 30. The address of the retiring president will be delivered by Dr. J. R. Schramm, editor of *Biological Abstracts.*—The American Phytopathological Society will hold sessions from Tuesday to Friday, December 28 to 31. Two new features of the program are to be a conference on fungicides and a plant-disease-survey round table, on Thursday and Friday mornings, respectively. There will be a conference on extension work in plant pathology on Tuesday afternoon, and a joint session with the Mycological Section of the Botanical Society of America on Thursday morning. An excursion is planned for Friday, to the establishment of E. I. du Pont de Nemours and Company at Wilmington. The annual phytopathologists' dinner will be held Wednesday evening, December 29.—The American Society of Plant Physiologists will hold sessions on Tuesday, Wednesday, and Thursday, December 28 to 30. A joint session with the American Society for Horticultural Science and with the Physiological Section of the Botanical Society of America is being planned. There will be a series of invitation papers, also an exhibition of apparatus and methods.—The American Fern Society will meet on the morning of Saturday, January 1, and all interested in fern study are invited to attend. Illustrated talks of a non-technical nature will be given, including one on the ferns of the Philadelphia region.—The Sullivant Moss Society will meet December 28 and 29. The society is made up of a group of people

interested, chiefly as an avocation, in the collection and study of mosses, hepatics and lichens. The society collection of mosses is housed in Philadelphia and will be available for inspection and study during this meeting. Some of the papers to be read are as follows: Mr. C. M. Roberts, "The Ecology of the Mosses of Central Pennsylvania"; Mr. Edwin B. Bartram, "Notes on Arizona Species of Mosses not before collected in North America"; Dr. O. E. Jennings, "The Ancestry and Relationship of the Mosses"; Dr. A. J. Grout, "Collecting in Florida"; Mr. A. T. Beals, "Early Authorities and Writers on Mosses"; Mr. Robert H. Bowen, "Comparison of a Mechanism of Cells of the Male Heads of the Moss Polytrichum with a Similar Mechanism of Certain Animal Cells."

F–G. Organizations related to both Sections F and G, Botanical and Zoological Sciences.—The Wednesday afternoon symposium of the American Society of Naturalists, on "Quantitative Biology," and the address of its president, Dr. J. Arthur Harris, on "The Humanitarian Value of Quantitative Biology," will interest all biologists. The dinner of the society is to occur Wednesday evening, December 29.—The Ecological Society of America, with a membership of those interested in any phase of the interrelationship between organisms and their environments, will hold its twelfth annual meeting from December 28 to 31. On Wednesday afternoon a joint session will be held with the Botanical Society of America and Thursday afternoon will be devoted to a symposium on "Oceanographic Problems," the latter in charge of Dr. J. W. Harshberger, of the University of Pennsylvania, who is president of the society. At a joint session with the American Society of Zoologists papers will be read on animal ecology. There will be an informal dinner, to which all biologists interested in ecology are invited. Persons not members of the society may obtain copies of the advance program, with abstracts of papers to be given, by writing to the secretary after December 1.—The American Microscopical Society will hold two sessions for the transaction of business. The first of these will be the meeting of the executive committee, at 4:30 on Tuesday, December 28. A full meeting of the membership is being planned for Wednesday, December 29, at 4:30.—The Union of American Biological Societies will have a council meeting at a time to be arranged.—The Genetics Sections of the American Society of Zoologists and the Botanical Society of America will hold sessions on Monday, Tuesday and Wednesday, December 27 to 29. Many investigators will this year present their results by exhibits and informal demonstrations, instead of by the reading of formal papers. On Wednesday morning there will occur a joint session with the Geneticists Interested in Agriculture, at which a symposium will be held on "Hybrid Vigor in Plants and Animals."—The American Nature-Study Society will hold its nineteenth annual meeting jointly with the American Nature Association. The program will concern itself with nature-education problems, with a consideration of the broad philosophy back of the nature-study movement and with the policies that have been followed by the various organizations in this field. The philosophy of the nature-study movement will be presented by L. H. Bailey, Mrs. Anna B. Comstock, Dan Beard, S. C. Schmucker and Hanor Webb. A society exhibition is being planned.—The Phi Sigma Society plans to hold sessions for reports by its members but details are still to be worked out. The society aims to devote its programs to contributions by beginners in science, for the encouragement of these junior members of the scientific group. This is an interesting movement.

H. Anthropology.—The American Anthropological Association and the American Folk-Lore Society will meet in affiliation with Section H during the period from December 28 to 30. Philadelphia is richly endowed with the anthropological collections of several institutions, which may be examined. Dr. Aleš Hrdlička, president of the organization, will give an illustrated address on the anthropology of Alaska and Northeastern Asia, presenting results of his recent explorations. The American Anthropological Association will hold its first council meeting on the morning of Tuesday, December 28, to be followed by the first session for the reading of papers. In the afternoon of that day the Folk-Lore Society and the second council meeting of the Anthropological Association will occur. The anthropologists' dinner will probably occur Tuesday evening, with the president's address. The first scientific session of Section H is planned for Wednesday morning, followed by its business session.

I. Psychology.—Although Section I of the A. A. A. S. is not preparing a program this year, an extensive one is being arranged by the American Psychological Association. On Tuesday evening there will be a joint session of Section I and Section Q (Education), with the annual Phi Delta Kappa dinner and the addresses of the retiring vice-presidents for these two sections. The retiring vice-president for Section I is Dr. C. E. Seashore, of the State University of Iowa, whose address will be on "Phonophotography in the Service of Psychology." The annual meeting of the American Psychological Association will be held in the Psychological Laboratory of the University of Pennsylvania from December 28 to 30. The mornings and afternoons will be devoted to sessions for the reading of papers. An apparatus exhibit will be an interesting and important feature.

On the evening of Tuesday, December 28, will be held the annual business meeting and the annual dinner, with the reading of the presidential address by Professor H. A. Carr, of the University of Chicago, will be held on Wednesday evening.

K. Social and Economic Sciences.—Section K has arranged an extended symposium on "Law Enforcement" for this meeting. The subject will be discussed from every point of view, introduced by an address on "Should the Tax Laws be enforceable and enforced?" by Professor Fred R. Fairchild, and an address on "The Importance of Research in Social and Economic Problems," by Professor Jos. H. Willits, vice-president for the section. Following these introductory remarks, Mr. H. H. Hart will speak on "Law Enforcement through Self Control," while the Honorable Edwin M. Abbott will speak on "Laws Men break and why." Among other important papers will be an address on "Crime in the Commercial Field," by Dr. Joseph Mayer, of Tufts College, and some remarks on "Local Crime Commissions," by Mr. Jas. M. Hepbron, of the Baltimore Criminal Justice Commission. Mr. Hepbron will be followed by Mr. H. B. Chamberlin, of the Chicago Crime Commission, and Mr. Chas. H. Pennoyer, of Boston, who will speak on "Native and Alien Criminals." The subject of "Immigration Law Enforcement" will be discussed by Dr. Donald Young, while "Lynching and Mob Violence" will be the subject of a discussion by Mr. Dubois, of New York City. In addition to the foregoing, there will be papers on the "Sale of Firearms," by the Honorable William McAdoo; on "Capital Punishment," by Warden Lewis E. Lawes; on "Burglary Insurance," by Professor Crooks; and on "The Changing American Prison," by Professor MacCormick. This symposium is planned to help concentrate public opinion on the imperative necessity for more effective law enforcement throughout this country, conforming to the general principles of procedure recently set forth by Chief Justice Taft. It goes without saying that lawlessness in this country is reaching menacing proportions to general welfare and that it is of the very first importance that there should be agreement on the essentials of the problem and its solution.—The Metric Association will hold its tenth anniversary meeting on Monday, December 27. Pioneers in the metric movement and younger people active in the metric campaign will cooperate in a special program of interest to manufacturers, engineers, scientists and educators. All who are interested are invited to attend the sessions and take part in the discussions. Alexander McAdie, of Harvard University; Theodore H. Miller, of the DeLaval Separator Company; S. J. Macfarren, of Washington; Walter Wood, of R. D. Wood and Company; Theodore A. Seraphin, of the Pennsylvania Department of Weights and Measures, and others are scheduled to speak. A "Weights and Measures" luncheon will be held at 1 o'clock, at the Bellevue-Stratford Hotel, and the convention will close with a "Metric Dinner" at 6:30, at the same hotel.

L. Historical and Philological Sciences.—The second joint meeting of the History of Science Society and the History-of-Science group in Section L will be held on Wednesday, December 29, this being the sixth annual meeting of the group. The program will be of special interest and significance in view of the fact that much of the early scientific life of America centered about Philadelphia, and the papers to be read will bear upon this phase. An exhibition of historical apparatus and instruments of epoch-making importance will be on view. The sessions, the exhibit and a luncheon to the members of the History of Science Society, as guests of Dr. Edgar F. Smith, former provost of the University of Pennsylvania, will be held in the John Harrison Laboratory of Chemistry. A council meeting of the History of Science Society will occur in the evening.

M. Engineering.—Section M, under the presidency of Dr. C. R. Richards, president of Lehigh University, has arranged what will surely prove to be a very important program in the Philadelphia series. This will consist of a symposium on "The Contributions that have been made by the Fundamental Sciences to the Advancement of Engineering and Industry," together with several addresses on important topics. The symposium will be held in the auditorium of the Franklin Institute, with forenoon and afternoon sessions on Wednesday, December 29. The speakers will be as follows: *Astronomy:* Dr. Frank Schlesinger, director of Yale University Observatory. *Biology:* Dr. Vernon Kellogg, permanent secretary of the National Research Council. *Chemistry:* Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association. *Economics:* Dr. Joseph H. Willits, head of the Department of Industry, Wharton School of Finance and Commerce, University of Pennsylvania. *Geology:* Dr. Heinrich Ries, professor of general and economic geology, Cornell University. *Mathematics:* Dr. G. A. Bliss, professor of mathematics, University of Chicago. *Medical Science:* Dr. Randle C. Rosenberger, professor of preventive medicine and bacteriology, Jefferson Medical College. *Physics:* Dr. R. A. Millikan, director of the Norman Bridge Laboratory of Physics, California Institute of Technology. *Psychology:* Dr. J. McK. Cattell, president of the Psychological Corporation and editor of SCIENCE and other scientific journals. The symposium will be followed by a general discussion. For Wednesday evening at 6:30 a

subscription dinner at four dollars is being arranged. Those who plan to partake should immediately inform Mr. Charles E. Billin, at the Philadelphia Engineers' Club, 1317 Spruce Street. Should the dinner prove impracticable an evening session will be held. Addresses that will be delivered in the evening are as follows: Dr. W. R. Whitney, director of the Research Laboratory of the General Electric Co., Schenectady, N. Y.: "The Stimulation of Research in Pure Science that has resulted from the Needs of Engineers and of Industry." Mr. Harrison P. Eddy, consulting engineer, Boston, Mass., representing the *American Society of Civil Engineers:* "Imhoff Tanks." Dr. M. Luckiesh, director of the Lighting Research Laboratory, National Lamp Works, Cleveland, Ohio, representing the *Illuminating Engineering Society:* "The Scientific Aspects of Lighting." Mr. W. H. Fulweiler, chemical engineer, United Gas Improvement Co., Philadelphia, representing the *American Society for Testing Materials:* "The Relationship between Science and the Study and Testing of Engineering Materials."

N. Medical Sciences.—Section N will hold two sessions on Tuesday, December 28. The programs, as in recent years, have been arranged by the section committee with the aim of bringing together science workers in the more fundamental aspects of medicine and the fundamental sciences most closely related to medical science. The Philadelphia sessions will open with the official address of the retiring vice-president for Section N, Professor A. J. Carlson, of the University of Chicago, on "Tendencies in Research of Bio-Medical Sciences." A symposium on "Growth in Health and Disease" will include papers by Dr. Oscar Riddle, of the Station for Experimental Evolution of the Carnegie Institution of Washington; Professor Raymond Pearl, of the Johns Hopkins University; Professor W. J. V. Osterhout, of the Rockefeller Institute for Medical Research; Professor W. W. Swingle, of the State University of Iowa, and Dr. Frederick S. Hammett, of the Wistar Institute.—The afternoon session is to be devoted to papers on biological aspects of fundamental medical problems, with papers by Dr. C. L. Shear, of the U. S. Bureau of Plant Industry; Colonel J. F. Siler, of the U. S. Army; Dr. L. O. Howard, of the U. S. Bureau of Entomology, dean of American medical entomologists; Professor R. Bennett Bean, of the University of Virginia, and Professor Edgar Allen, of the University of Missouri.—All who are interested in the extensive and ramifying field where medical science and the fundamental sciences overlap are cordially invited to these sessions of Section N.—The Society of American Bacteriologists will hold its annual meeting December 28 to 30, with three symposia of invited papers as well as sessions for the reading of contributions. The titles of the symposia are: "Filterable Viruses," "Some Problems of Soil Bacteriology" (to be presented at a joint session of the Society of Bacteriology and Section O—Agriculture—of the American Association), and "The Teaching of Bacteriology in Institutions other than Medical Schools." The sessions of Tuesday and Wednesday will be of the society as a whole, while there will be two sections for Thursday, on Medical Bacteriology, Immunology and Comparative Pathology and on Agricultural and Industrial Bacteriology.—The American Society of Parasitologists will hold its second annual meeting from December 28 to 31. A prominent feature of the program will be an address by Professor George H. F. Nuttall, of Cambridge University, who is director of the Molteno Institute for Research in Parasitology. Dr. Nuttall will be a guest of the society at its annual dinner. At the annual business meeting, one of the items of chief interest will be the report of the committee appointed to study the teaching of parasitology in this country, under the chairmanship of Dr. F. D. Barker. Another important feature will be the address of the retiring president of the society, Dr. C. W. Stiles.

O. Agricultural Sciences.—Section O will hold two sessions on Thursday, December 30, with papers by well-known authors, on economic problems involved in production and disposal of farm crops. Owing to the much regretted recent death of Dr. C. V. Piper, who was chairman of Section O at the Kansas City meeting last year, there will be no vice-presidential address given before this section at the Philadelphia meeting.—On Thursday evening will be held the annual dinner for agricultural scientists, with an address on "Factors of Significance in the Development of European Agriculture," by Dr. J. G. Lipman, director of the New Jersey Agricultural Experiment Station. A joint session of Section O and the Society of American Bacteriologists will be held Wednesday afternoon, the program being a symposium on "Some Problems in Soil Bacteriology." A joint session of the American Society of Agronomy and the section will occur Friday forenoon, with a symposium on "The Improvement of Small Grains through Breeding," which is being arranged by Dr. T. A. Kiesselbach, of the University of Nebraska.—The recent programs of the American Society for Horticultural Science have been very crowded and the meeting period is this year extended to include four days (December 28 to 31) instead of three as heretofore. The increasing physiological interest of students of horticulture will be accommodated and encouraged by a joint session with the American Society of Plant Physiologists and the Physiological Section of the Botanical Society of America. Dr.

L. H. Bailey, president of the American Association and of the Botanical Society, will give an address on "Trends in Horticulture." Other well-known speakers, whose names will be announced later, will appear in the program. Some of the topics to be discussed are: "Arsenical Residues in Apples," "Nitrogen Metabolism in the Apple," "Apple Propagation by Root Cuttings and Limbs," "Effects of Transplanting and Budding on Growth of Apple Seedlings," "Fruit Bud Formation in the Fig," "Summer Frost Prevention on Peat Lands," "Effect of Potash on Carrying Qualities of Tomatoes," "Influence of Root Desiccation and Root Pruning on Asparagus."—The Society of American Foresters will hold sessions on Wednesday and Thursday, December 29 and 30. Contributions will be read on many subjects. Two general discussions or symposia will be held on "The Practice of Forestry on Private Lands" and on "Weather and Forest Fires."—The Potato Association of America will have sessions devoted to discussions of the application of science to certified seed-potato production, as well as papers on potato-storage problems, potato production as related to environmental conditions and potato marketing. Details are to be announced later.—The Crop Protection Institute will hold its annual dinner meeting on the evening of Tuesday, December 28, promptly at 6 o'clock.

Q. Education.—Sessions of Section Q will be held Tuesday to Thursday, December 28 to 30, devoted to reports and addresses on educational investigation and related matters. There will be three sessions on problems of college education; one of these being on personnel and management of college freshmen, another on college and university instruction, and a third on university administration and curriculum building. Reports will be presented on several nation-wide investigations of college and professional education. One session will be devoted to scientific studies on character and personality education. A special feature will be a joint dinner meeting of the Phi Delta Kappa Fraternity and Sections I and Q of the association, with the annual Phi Delta Kappa dinner; this will occur on Tuesday evening. The official address of Dr. Otis W. Caldwell, retiring vice-president for Section Q, and that of Dr. C. E. Seashore, retiring vice-president for Section I, will be given at the dinner session. One or more joint sessions with the American Association of University Professors are planned. Attention should be called here to very interesting educational features of the program of the National Council of Geography Teachers (announcements under E) and the special program on research in colleges, to be given under the auspices of one of the subcommittees of the American Association's Committee of One Hundred on Scientific Research (see General Sessions, above).

Organizations related to the American Association as a whole.—The twelfth annual meeting of the American Association of University Professors, being the first annual meeting of this organization to be held in Philadelphia, will occur Friday and Saturday, December 31 and January 1. The program will be based primarily on important reports recently published by the Committee on Methods of Increasing the Intellectual Interest and Raising the Intellectual Standards of Undergraduates. The particular reports to be considered at Philadelphia are those dealing with college athletics, with a survey of the practice of different colleges and universities in regard to sectioning on the basis of ability, and with the problems of selection, retention and promotion of undergraduates. It is also expected that reports will be presented on cooperation with Latin-American universities, on freedom of teaching in science, on the promotion of research in colleges and universities, and on the status of women in college and university faculties. The Association of University Professors includes at present more than six thousand members, with local chapters in more than two hundred institutions.—The Gamma Alpha Graduate Scientific Fraternity will hold its annual meeting and banquet on Tuesday, December 28, at the Adelphia Hotel. The early date for the banquet will necessitate prompt registration at the Gamma Alpha booth in the general registration offices, in the exhibition hall (Weightman Hall, 33rd and Spruce Sts.).—The Sigma Delta Epsilon Graduate Women's Scientific Fraternity will hold two breakfast meetings at Philadelphia, probably Tuesday and Wednesday of convocation week. The first of these will be for members only and the second will be open to all women who are interested in the work of this organization.

TRANSPORTATION

RAILROAD TICKETS

Reduced Rates and Dates

Reduced railway rates, certificate plan, for those attending this meeting have been granted by railway passenger associations of the United States and Eastern Canada. The association is again very fortunate in this, and the courtesy and public spirit of the railway associations will be greatly appreciated. The round-trip fare is to be one-and-one-half times the regular one-way fare.

Tickets to Philadelphia are to be purchased within time limits as follows. *December 23 to 29,* inclusive, for the following lines: Canadian Eastern lines, New England lines, Trunk lines, Central lines, Southeastern lines, Western and Transcontinental lines from

Illinois, St. Louis, Mo., Hannibal, Mo., and Keokuk, Iowa. *December 22 to 28,* inclusive, from Iowa (except Keokuk), Kansas, Manitoba (on Great Northern, Northern Pacific and Minnesota, St. Paul & Sault Ste. Marie Rys., also from Winnipeg *via* Canadian Pacific Ry.), Minnesota, Missouri (except Hannibal and St. Louis), Nebraska, Northern Michigan, North Dakota, South Dakota and Wisconsin, also from Julesburg, Colo. *December 21 to 27,* inclusive, from Colorado (except Julesburg), Montana, New Mexico, Utah and Wyoming. *December 17 to 23,* inclusive, from Arizona, British Columbia, California, Idaho, Nevada, Oregon and Washington. For the Southwestern lines the limits are *December 21 to 27,* inclusive, from Oklahoma and Texas; *December 22 to 28,* inclusive, from Kansas and Missouri; *December 23 to 29, inclusive,* from Arkansas and Louisiana. (The following Southwestern lines are not party to the reduced excursion fares: Arkansas & Louisiana-Missouri Ry.; Ft. Smith & Western R. R.; Graysonia, Nashville & Ashdown R. R.; Kansas, Oklahoma & Gulf Ry.; Louisiana & Arkansas Ry.; Mississippi River & Bonne Terre Ry.; National Railways of Mexico; St. Louis, El Reno & Western Ry.)

Purchasing Tickets to Philadelphia

1. *For persons residing in the regions of reduced rates* (almost all the United States and Canada, see above). Purchase a first-class, full-fare, one-way, through ticket to Philadelphia, and be sure to secure a certificate on Standard Certificate Form, reading for the Philadelphia meeting of the "American Association for the Advancement of Science and Associated Societies"; a receipt is not required.

2. *For persons residing outside of the regions of reduced rates.* Purchase a round-trip ticket to nearest station issuing through tickets to Philadelphia and lying within the region of reduced rates. At that station purchase a one-way ticket to Philadelphia and secure a certificate as directed in the preceding paragraph.

Endorsement and Validation of Railway Certificates

Upon arrival at the meeting, register immediately at the registration offices in the exhibition hall (33rd and Spruce Sts.). Be sure to fill in all blanks on the registration card and leave the card at the registration desk, where you will receive a numbered *identification* card, which will be receipted for the registration fee if you pay it. Then leave your railway certificate at the *validation* desk, being sure that the identification card (which you keep) is there marked to show that you have deposited a certificate. Your certificate will subsequently be endorsed by our office and then validated by the agent of the transportation companies. Call for it later at the validation desk, presenting your identification card.

Unvalidated certificates will not be honored for the purchase of return tickets, and unendorsed certificates can not be validated. Registration is therefore necessary in order to have railway certificate validated.

Purchasing Return Tickets from Philadelphia

Ticket agents at Philadelphia will honor any properly endorsed and validated certificate if presented at least 30 minutes before the scheduled time of departure of the train for which it is to be used. To each person presenting an endorsed and validated certificate they will sell a continuous passage, one-way, return ticket for one half of the regular fare, by the same route as that followed on the trip to Philadelphia. The last date on which certificates may be validated is December 31. The last date on which return tickets may be purchased is January 5.

TRANSPORTATION IN PHILADELPHIA

TO REACH HOTELS FROM RAILWAY STATIONS

Directions would be somewhat complicated. Inquire at information desk in station.

TO REACH THE MEETING PLACES FROM HOTELS

Since so many different hotels will be used by those attending the meeting, it is best for each person to make inquiry at his hotel, thus securing information as to how to proceed from that hotel to the university and return. Note that the registration offices are to be in Weightman Hall (the University Gymnasium), on the southeast side of 33rd Street, about a square and a half south of Walnut, just beyond where 33rd Street bends from south to southwest.

TO REACH THE MEETING PLACES FROM RAILWAY STATIONS

From Broad Street Station (Broad and Market Sts.) or Reading Terminal (12th and Market Sts.)—Take subway-elevated westbound on Market St. and leave cars at 32nd St. (West Philadelphia Station, Pennsylvania R. R.); thence proceed as from West Philadelphia Station. Or, take subway-surface cars westbound on Market St., marked 11, 34 or 37, leaving cars at Woodland Ave. and 33rd, 34th or 36th St. For Registration Offices (Weightman Hall, the University Gymnasium), walk south on 33rd St. Gymnasium is on left just beyond where 33rd St. bends to southwest.

From Baltimore and Ohio R. R. Station (24th and Chestnut Sts.)—Take surface car (marked 13) or bus (marked D) westbound on Walnut St. Leave conveyance at 33rd or 34th St. For Registration offices (Weightman Hall, the University Gymnasium),

leave conveyance at Walnut and 33rd Sts. and walk south on 33rd St. Gymnasium is on left just beyond where 33rd St. bends to southwest.

From West Philadelphia Station (32nd and Market Sts.)—Walk southwest on Woodland Ave. For Registration offices (Weightman Hall, the University Gymnasium), turn south on 33rd St. Gymnasium is on left just beyond where 33rd St. bends to southwest. Or, take surface cars southwest on Woodland Ave., to 33rd, 34th or 36th St. For Registration offices, leave cars at Woodland Ave. and 33rd St. and walk south to just beyond where 33rd St. bends to southwest (see just above).

TAXICABS IN PHILADELPHIA

Taxicabs may be secured at railway stations, at all hotels and by asking (and waiting a little) at the information desk in the Registration offices (Weightman Hall, the University Gymnasium). The taxicab rates are, for Yellow Cabs, 20 cents for initial two thirds of a mile and 10 cents for each additional one third of a mile. Quaker Cabs charge 10 cents more for initial two thirds of a mile. There is no extra charge for more than one passenger and four or five may go together at a reasonable cost per person. The trip from Broad St. Station to the Registration offices (Weightman Hall, the University Gymnasium) costs about 70 cents. From the Bellevue-Stratford Hotel to the Registration offices it costs about 60 cents.

DISTANCES FOR PEDESTRIANS

From the West Philadelphia Station all the university buildings are within comfortable walking distance for most people (less than a mile). The same is true from the West Philadelphia Station to the Pennsylvania, Normandie and Bartram Hotels, and from them to the university buildings. From Broad Street Station and the neighboring downtown hotels the distance is about two miles.

LODGING ACCOMMODATIONS

A list of Philadelphia hotels, with prices, etc., has been published in SCIENCE for November 12, page 467. The hotel accommodations will be excellent this year and probably more than adequate, but those who plan to attend the meeting should reserve hotel rooms immediately, if they have not already done so, by writing directly to the hotel management in each case. The Bellevue-Stratford Hotel will be the general headquarters of the American Association and it can care for a very large number, but many of the socie-

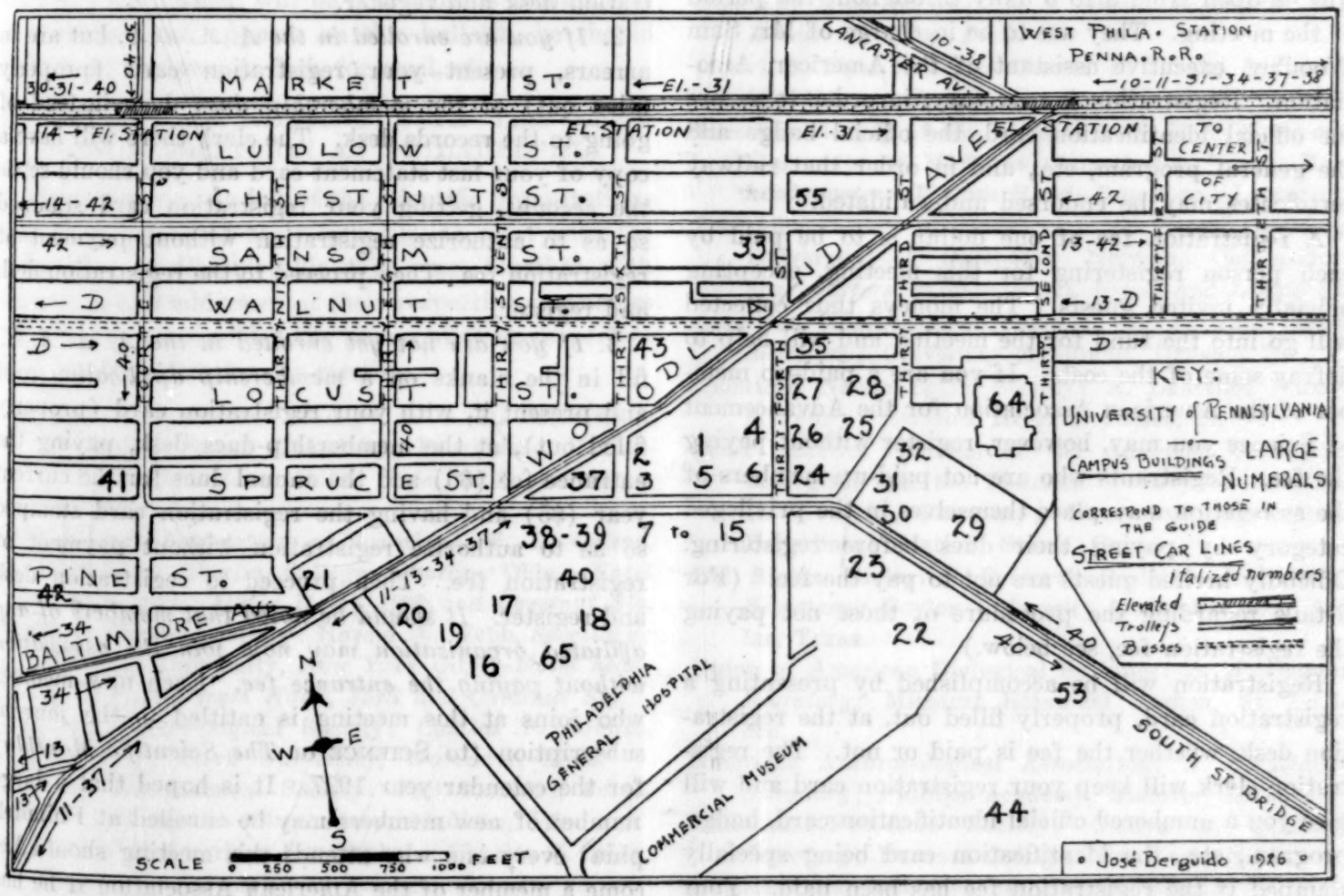


Chart showing streets in the vicinity of the University of Pennsylvania and locations of the university buildings, supplied by Mr. Thomas Hart, chairman of the local subcommittee on transportation. A guide to the university will be given to all who register.

ties meeting with the association this year will have other hotel headquarters. As far as possible, the hotel headquarters of each society is shown on the list of societies that plan to meet with the association (see below).

The Young Men's Christian Association (1425 Arch St.) will have about fifty rooms available for those attending the meeting. Prices of single rooms are $1.50 and $2.00 per day, the higher priced ones having running water. Rooms in private homes or in rooming houses near the university may be used for the meeting at less than usual hotel prices. Information regarding such rooms may be secured at the information desk in the registration offices.

REGISTRATION AT PHILADELPHIA

Registration in General

Those who attend any of the sessions of the fifth Philadelphia meeting, which will be fully open to all, whether they are members of the association or not and whether they are from away or reside in Philadelphia, should register as promptly as possible at the registration offices for the meeting, which will be in the exhibition hall (Weightman Hall, the University gymnasium) at 33rd and Spruce Sts. The offices will be open from 9 to 6 daily throughout the period of the meeting. They are to be in charge of Mr. Sam Woodley, executive assistant of the American Association. Registration is necessary, in order to secure the official identification card, the official badge and the general program, etc., and in order that railway certificates may be endorsed and validated.

A registration fee of one dollar is to be paid by each person registering for this meeting, excepting officially invited guests. The moneys thus collected will go into the fund for the meeting and will help to defray some of the costs. If you are a paid-up member of the American Association for the Advancement of Science you may, however, register without paying the fee. Registrants who are not paid-up members of the association may place themselves in the privileged category by paying their dues before registering. Officially invited guests are not to pay the fee. (For details regarding the procedure of those not paying the registration fee, see below.)

Registration will be accomplished by presenting a registration card, properly filled out, at the registration desk, whether the fee is paid or not. The registration clerk will keep your registration card and will give you a numbered official identification card, badge, program, etc., the identification card being specially stamped if the registration fee has been paid. Your name will be placed immediately in the visible directory of those in attendance. After registration each registrant should leave his railway certificate at the validation desk, there having his identification card receipted for the certificate. (See above, under Railroad Tickets.)

Delegates from institutions and organizations, and all official guests, are specially requested to register as such, noting on their registration cards their exact status in this particular.

Registration without Payment of the Registration Fee

As has been noted, paid-up members of the American Association for the Advancement of Science are to have the privilege of registering without paying the registration fee, but this may occasion some delay in the registration procedure. The delay will be short, however, if the following paragraphs are accurately adhered to.

1. *If you are a life member of the A. A. A. S., or if you are an annual member* not in arrears (*i.e.*, if your dues for the current year, due last October 1, have been received in Washington before December 22), present your registration card (properly filled out) at the *records* desk before going to the registration desk at all. Your record will there be verified, by reference to the association roll, and your card will be stamped so as to authorize registration without payment of the fee. Then proceed to the registration desk and register.

2. *If you are enrolled in the A. A. A. S.* but are in arrears, present your registration card (properly filled out) at the *membership dues* desk instead of going to the records desk. The clerk there will have a copy of your last statement card and you should settle the account, getting your registration card stamped so as to authorize registration without payment of registration fee. Then proceed to the registration desk and register.

3. *If you are not yet enrolled in the A. A. A. S.*, fill in the blanks on a *membership application card* and present it, with your registration card (properly filled out), at the membership-dues desk, paying the entrance fee ($5) and the annual dues for the current year ($5) and having the registration card stamped so as to authorize registration without payment of registration fee. Then proceed to registration desk and register. *It should be noted that members of any affiliated organization may now join the association without paying the entrance fee.* Each new member who joins at this meeting is entitled to the journal subscription (to SCIENCE or *The Scientific Monthly*) for the calendar year 1927. It is hoped that a large number of new members may be enrolled at Philadelphia; every one who attends this meeting should become a member of the American Association if he has not already done so.

4. *If, to avoid delay in registering,* you registered without first securing the remission of the registra-

tion fee, you may afterwards have the fee refunded by applying at the Records desk (if you are paid-up) or at the Membership Dues desk (if you are not paid-up) *after 4 o'clock* on any day of the meeting. Authorization for refund will be shown by means of special card from the Records or Membership-Dues desk and refunding will be made at Cashier's desk.

INFORMATION SERVICE AT THE PHILADELPHIA MEETING

Those in attendance at the meeting may obtain information of all sorts by applying at the information desk in the registration offices, in Weightman Hall, the gymnasium of the University of Pennsylvania. Attention is called, however, to the visible directory of those in attendance, from which information regarding attendance and the addresses of attending members of the association and societies may be obtained without application at the desk.

MAIL, EXPRESS, TELEGRAMS, ETC.

Persons attending the meeting may have mail, etc., addressed to them in care of the American Association for the Advancement of Science, Registration Offices, Weightman Hall, University of Pennsylvania, Philadelphia, Pa. They should inspect the personal bulletin every day, which will be conveniently located. If a person's name appears on this bulletin, he should inquire at the proper desk for mail, etc.

ORGANIZATIONS MEETING WITH THE AMERICAN ASSOCIATION AT PHILADELPHIA

The following is a list of the scientific organizations that have intimated their intention to meet with the association at Philadelphia this year, together with the names and addresses of their respective secretaries and (as far as possible) the names of their respective hotel headquarters for the meeting.

American Mathematical Society: R. G. D. Richardson, *Secretary;* Brown University, Providence, R. I.—*Hotel headquarters, Aldine Hotel, 19th and Chestnut Sts.*

Mathematical Association of America: W. D. Cairns, *Secretary;* Oberlin College, Oberlin, Ohio.—*Hotel headquarters, Aldine Hotel, 19th and Chestnut Sts.*

American Physical Society: Harold W. Webb, *Secretary;* Columbia University, New York City.—*Hotel headquarters, Bartram Hotel, 33rd and Chestnut Sts.*

American Meteorological Society: Charles F. Brooks, *Secretary;* Clark University, Worcester, Mass.

American Astronomical Society: Joel Stebbins, *Secretary;* Washburn Observatory, Madison, Wis.

Association of American Geographers: Charles C. Colby, *Secretary;* University of Chicago, Chicago, Ill.

National Council of Geography Teachers; George J. Miller, *Secretary;* State Teachers College, Mankato, Minn.

American Alpine Club: Henry B. deV. Schwab, *Secretary;* 11 Broadway, New York City.

American Society of Zoologists: Dwight E. Minnich, *Secretary;* University of Minnesota, Minneapolis, Minn.—*Hotel headquarters, Walton Hotel, Broad and Locust Sts.*

Entomological Society of America: J. J. Davis, *Secretary;* Purdue University, Lafayette, Ind.—*Hotel headquarters, Hotel Normandie, 36th and Chestnut Sts.*

American Association of Economic Entomologists: C. W. Collins, *Secretary;* Melrose Highlands, Mass.—*Hotel headquarters, Hotel Normandie, 36th and Chestnut Sts.*

American Society of Parasitologists: W. W. Cort, *Secretary;* 615 N. Wolfe St., Baltimore, Md.—*Hotel headquarters, Pennsylvania Hotel, 39th and Chestnut Sts.*

Botanical Society of America: I. F. Lewis, *Secretary;* University, Va.—*Hotel headquarters, Pennsylvania Hotel, 39th and Chestnut Sts.*

American Phytopathological Society: R. J. Haskell, *Secretary;* Bureau of Plant Industry, Washington, D. C.—*Hotel headquarters, Hotel Normandie, 36th and Chestnut Sts.*

American Society of Plant Physiologists: Scott V. Eaton, *Secretary;* University of Chicago, Chicago, Ill.

Sullivant Moss Society: A. T. Beals, *Secretary;* 2929 Broadway, New York City.

American Fern Society: Charles S. Lewis, *Secretary;* 835 Edgewood Ave., Trenton, N. J.

American Society of Naturalists: A. F. Shull, *Secretary;* University of Michigan, Ann Arbor, Mich.—*Hotel headquarters, Walton Hotel, Broad and Locust Sts.*

Ecological Society of America: A. O. Weese, *Secretary;* University of Oklahoma, Norman, Okla.—*Hotel headquarters, Walton Hotel, Broad and Locust Sts.*

American Microscopical Society: H. J. Van Cleave, *Secretary;* University of Illinois, Urbana, Ill.

American Nature-Study Society: E. Laurence Palmer, *Secretary;* Renwick Heights, Ithaca, N. Y.

Joint Genetics Sections of the American Society of Zoologists and the Botanical Society of America: L. C. Dunn, *Secretary;* Connecticut Agricultural Experiment Station, Storrs, Conn.

Phi Sigma Biological Research Society: C. I. Reed, *Secretary;* Baylor University Medical School, Dallas, Texas.

Union of American Biological Societies: B. M. Duggar, *Secretary;* Missouri Botanical Garden, St. Louis, Mo.

American Anthropological Association: A. V. Kidder, *Secretary;* Phillips Academy, Andover, Mass.

American Folk-Lore Society: Gladys A. Reichard, *Secretary;* Barnard College, New York, N. Y.

American Psychological Association: Samuel W. Fernberger, *Secretary;* University of Pennsylvania, Philadelphia, Pa.—*Hotel headquarters, Pennsylvania Hotel, 39th and Chestnut Sts.*

Metric Association: Howard Richards, Jr., *Secretary;* 156 Fifth Ave., New York City.

History of Science Society: Frederick E. Brasch, *Secretary;* Library of Congress, Washington, D. C.

Society of American Bacteriologists: J. M. Sherman, *Secretary;* Cornell University, Ithaca, N. Y.—*Hotel headquarters, Bellevue-Stratford Hotel,* Broad and Walnut Sts.

American Society of Agronomy: P. E. Brown, *Secretary;* Iowa State College, Ames, Iowa.

American Society for Horticultural Science: C. P. Close, *Secretary;* College Park, Md.

Society of American Foresters: E. R. Hodson, *Secretary;* Atlantic Building, Washington, D. C.

Potato Association of America: Walter M. Peacock, *Secretary;* Office of Horticultural Investigations, Washington, D. C.

Crop Protection Institute: Paul Moore, *Secretary;* National Research Council, Washington, D. C.—*Hotel headquarters, Lido Hotel.*

Society of Sigma Xi: Edward Ellery, *Secretary;* Union College, Schenectady, N. Y.

American Association of University Professors: H. W. Tyler, *Secretary;* Massachusetts Institute of Technology, Cambridge, Mass.—*Hotel headquarters, Bartram Hotel,* 33rd and Chestnut Sts.

Gamma Alpha Graduate Scientific Fraternity: C. W. Dodge, *Secretary;* 20 Divinity Ave., Cambridge, Mass.

Sigma Delta Epsilon Graduate Women's Scientific Fraternity: Edna M. Feltges, *Secretary;* Orlando, Fla.

SPECIAL PRIVILEGE FOR MEMBERS OF AFFILIATED SOCIETIES

New members of the association regularly pay an entrance fee of five dollars, which is now remitted, however, to members of any affiliated organization, including the affiliated state academies. Those who join at the Philadelphia meeting and take advantage of this privilege should fill in the blanks on a blue membership application card and present card and dues for 1926–27 ($5.00) at the membership dues desk in the registration offices (Weightman Hall, Spruce and 33rd Sts.). New members who join the association at the meeting are entitled to register without paying the one-dollar registration fee.

Copies of a booklet on the Organization and Work of the American Association, as well as membership application cards and sample copies of the journals, may be secured at any time from the permanent secretary's Washington office in the Smithsonian Institution Building. Membership in the association includes a subscription to the weekly journal SCIENCE, or the *Scientific Monthly,* for the calendar year beginning at the close of the annual meeting. The journal alone is worth more than the annual membership dues. Members of the association may subscribe for the *Science News-Letter,* published by *Science Service,* Washington, D. C., at the specially reduced price of $3.00 per year.

BUSINESS SESSIONS AT THE PHILADELPHIA MEETING

The members of the executive committee of the American Association, the secretaries of the association sections and the secretaries of the scientific societies that meet with the association this year will dine together at Philadelphia, probably at the Bellevue-Stratford Hotel, on Sunday, December 26, at 6:30. The evening will be devoted to the annual secretaries' conference on the affairs of the association and its relation to the associated organizations.

The executive committee will hold its first Philadelphia session in the permanent secretary's room at the Bellevue-Stratford Hotel, on December 27, at 10 o'clock. Matters for consideration by the committee or by the council should be transmitted to the permanent secretary at the Washington office, to arrive by December 21. Other sessions of the executive committee will probably be held at 10 o'clock on Tuesday, Wednesday, Thursday and Friday mornings, in the council room at the University of Pennsylvania (Houston Hall).

The council of the association will meet in the council room at the university (see just above) on Monday afternoon, December 27, at 2 o'clock, and other sessions are scheduled to occur in the same room at 9 o'clock on Tuesday, Wednesday, Thursday and Friday mornings. It is probable that the annual election of officers of the association will occur at the council session Thursday morning. Business to be considered by the council must regularly be first brought before the executive committee.

FURTHER ANNOUNCEMENTS AND REPORTS OF THE PHILADELPHIA MEETING

Some later announcements about the approaching meeting will be made in SCIENCE. Full information will be contained in the general program, which will be available in the registration offices Monday morning and throughout the week of the meeting.

It is planned that a general report of the fifth Philadelphia meeting will appear as a special issue of SCIENCE about February 1. This is to contain reports on the main general features of the convention, the business transacted, and especially a full series of readable reports on the section and society programs, the latter reports based on material to be supplied by the secretaries of those organizations. All new members who join the association before the time of its publication will automatically receive the special issue of SCIENCE.

BURTON E. LIVINGSTON,
Permanent Secretary

SCIENTIFIC EVENTS

EXHIBITION AT THE SCIENCE MUSEUM AT SOUTH KENSINGTON

THE authorities of the Science Museum at South Kensington have arranged to hold periodical exhibitions for the purpose of bringing to the notice of the general public results of modern physical research, which would otherwise remain hidden from them in technical reports. The first of these exhibitions, according to the London *Times*, was opened on November 6. It consisted of apparatus and material illustrating work recently done at the National Physical Laboratory at Teddington in metallurgy, engineering and physics. Further exhibitions by other research institutions will follow at intervals of a few months, the plan being to change them about three times a year.

Some of the research that was illustrated in the first exhibition bears on problems the importance of which has long been generally recognized. One of these is that of the protection of X-ray operators from the injurious effects produced by stray rays. The matter is undergoing investigation, and apparatus will be shown which is used to estimate the absorbing value of different materials.

Apparatus has been constructed which first produces and then photographs sound waves within a small architectural model. These photographs show the passage of the sound waves and their reflection from irregular projections with the clearness of diagrams. A number of such photographs will be exhibited, together with a photograph of the special apparatus used for the purpose.

Special hygrometers, designed to determine the amount of moisture in cold stores where the ordinary instruments can not be satisfactorily used, will be shown. There is also apparatus for ascertaining the rate at which heat is absorbed by different materials employed in connection with cold storage.

Many exhibits relate to matters with which the public is less familiar. There are all-metal high vacuum pumps for exhausting the air in tubes and other vessels; instruments for determining the behavior of lubricants; models consisting of balls mounted on wires, which represent the arrangement of atoms in a molecule of metal or alloy, and pieces of metal showing how the defect of the production of holes by gas has been overcome. There will also be on view special crucibles and specimens of quite pure metals, of the chemical and physical properties of which little is yet known. Some further exhibits will be added towards the end of the month by the adhesive research committee of the Department of Scientific Research.

PRESENTATION OF THE YOSEMITE MUSEUM TO THE PARK SERVICE

THE newly completed museum in the Yosemite National Park, California, was formally turned over to the National Park Service of the U. S. Department of the Interior on October 29. Chauncey J. Hamlin, chairman of the committee on museums in national parks of the American Association of Museums, made the presentation. Acting Secretary E. C. Finney accepted on behalf of the Park Service.

Funds for the museum building and equipment were obtained by the American Association of Museums from the Laura Spelman Rockefeller Memorial, which made a grant of $75,550 for the purpose.

In making the presentation Mr. Hamlin read a letter which he had addressed to the Secretary of the Interior, which said in part:

> It was the original purpose to construct and equip a museum at Yosemite that would properly house the collections then on hand and provide facilities appropriate to the needs of the general public and visiting men of science.
>
> It is my privilege to report to you that the Yosemite Museum is now completed. It has four large exhibition rooms, a lecture hall, a library and stack room, headquarters for the nature guide service, workrooms and laboratories and valuable exhibition material quite beyond the original plans.
>
> This achievement has been made possible through the sympathetic and cooperative assistance of the National Park Service, the financial assistance of the Yosemite Natural History Association and of the American Association of Museums and the personal efforts and gratuitous services of the members of our committee.
>
> Knowing your desires concerning the supreme purposes of the national parks, confident that the establishment of local museums is one of the most practical ways of educating the public, and with the authority given me by the council of the American Association of Museums, I now pass over to you, in this informal way, such rights and ownership as the association may have in the museum at Yosemite National Park, feeling sure that under federal administration its educational purposes will be maintained adequately.

THE TWENTY-FIFTH ANNIVERSARY OF THE BUREAU OF STANDARDS

THE twenty-fifth anniversary of the establishment of the Commerce Department's Bureau of Standards will be celebrated on December 4.

The committee in charge of the arrangements has provided an interesting program for the guests who will visit the bureau on that day. The bureau will keep "open house" from 10 till 5 o'clock, and from 12 to 2 luncheon will be served in the industrial building.

In the evening the bureau's staff will act as hosts at a dinner to be given at the New Willard hotel. Many distinguished guests, including scientific and technical men from all over the country, are expected to attend the celebration. Among these will be Dr. S. W. Stratton, president of Massachusetts Institute of Technology and for twenty-two years director of the bureau.

The bureau was created by act of congress on March 3, 1901. It took over the duties of the old division of weights and measures of the Coast and Geodetic Survey. From 1901 till 1903 the bureau came under the Treasury Department. In 1903 it was transferred to the Department of Commerce and Labor, now the Department of Commerce.

The bureau was originally housed in temporary quarters near the capitol. It now occupies more than a dozen permanent buildings on a large site at the corner of Van Ness Street and Connecticut Avenue. The staff, which numbered 14 people in 1901, has grown to about 800—two thirds of the employees being scientifically trained.

AWARD OF MEDALS BY THE ROYAL SOCIETY

THE following awards have been made by the Royal Society:

A Royal Medal to Sir William Hardy, F.R.S., for his pioneer work on colloidal chemistry and the theory of lubrication.

A Royal Medal to Professor A. V. Hill, F.R.S., for his distinguished work on the physical and chemical aspects of muscular contraction.

The Copley Medal to Sir Frederick Hopkins, F.R.S., for his distinguished and fruitful work in biochemistry.

The Rumford Medal to Sir Arthur Schuster, F.R.S., for his services to physical science, especially in the subjects of optics and terrestrial magnetism.

The Davy Medal to Sir James Walker, F.R.S., for his work on the theory of ionization and ionic equilibria in solution.

The Darwin Medal to Dr. D. H. Scott, F.R.S., for his contributions to paleophytology, particularly in relation to the period of coal.

The Hughes Medal to Admiral of the Fleet Sir Henry Jackson, F.R.S., for his pioneer work in the scientific investigation of radio-telegraphy and its application to navigation.

The following is a list of those recommended by the president and council of the Royal Society for election to the council at the anniversary meeting on November 30:

President—Sir Ernest Rutherford.
Treasurer—Sir David Prain.
Secretaries—Mr. J. H. Jeans and Dr. H. H. Dale.
Foreign Secretary—Sir Richard Glazebrook.

Other members of council—Sir Hugh Anderson, Dr. F. W. Aston, Professor L. Bairstow, Professor F. G. Bower, Sir Archibald Garrod, Professor E. J. Garwood, Sir Thomas Heath, Professor J. P. Hill, Dr. P. Chalmers Mitchell, Professor R. Muir, Sir John Parsons, Sir Robert Robertson, Mr. A. A. C. Swinton, Sir Gilbert Walker, Sir James Walker and Mr. W. C. D. Whetham.

SCIENTIFIC NOTES AND NEWS

THE Trudeau Medal for 1926 of the National Tuberculosis Association was awarded at the annual meeting in Washington to Dr. Theobald Smith, Princeton, director of the department of animal pathology of the Rockefeller Institute for Medical Research, who in 1896 first distinguished between the bovine and the human bacillus of tuberculosis.

DR. FRIDTJOF NANSEN was installed as rector of the University of St. Andrews on November 3 after having been admitted to the honorary degree of doctor of laws. The honorary degree of LL.D. was also conferred among others upon Professor Vilhelm F. K. Bjerknes, of the University of Oslo; Professor Bjorn Helland-Hansen, of Bergen; Captain Otto Neumann Sverdrup (captain of the *Fram*), and Sir T. W. Edgeworth David.

DR. CHARLES H. HERTY has resigned the presidency of the Synthetic Organic Chemical Manufacturers Association of the United States in order to assume the duties of adviser to the Chemical Foundation, Inc. Dr. Herty will devote his entire time to the work of the Chemical Foundation.

DR. CHARLES J. FISH, resident oceanographer at the station of the United States Bureau of Fisheries at Woods Hole, has been appointed director of the new Buffalo Museum of Science.

AT the recent clinical congress in Montreal of the American College of Surgeons honorary fellowships were conferred on Professor Robert Alessandria, of Rome; Professor Archibald Young, of Glasgow; Sir Ewen Maclean, of Cardiff; Professor L. E. Barnett, of Dunedin, New Zealand, and Professors John Fraser and David Wilkie, of Edinburgh.

SENATORE G. MARCONI has been elected an honorary member of the British Institution of Electrical Engineers.

SIR WILLIAM ORPEN is painting a portrait of Professor J. A. Fleming, whose friends and admirers are raising a fund for this purpose. The portrait is to hang in University College, London, with which Professor Fleming has been long connected. A replica of the portrait is also to be presented to the British Institution of Electrical Engineers.

THE engineering department of the University of

Cambridge has been presented with portraits of Sir Alfred Ewing, the late Professor Bertram Hopkinson and Professor Inglis.

DR. JAMES BRYAN HERRICK has been made professor emeritus in the department of medicine in Rush Medical College of the University of Chicago.

THE title of emeritus professor has been conferred upon Professor O. J. Kauffmann, joint professor of medicine in the University of Birmingham from 1913 to 1926.

THE trustees of Teachers College have granted the request of Professor George A. Coe, professor of education, to be retired from active service on February 1, 1927.

THE Rockefeller Institute for Medical Research announces the election of Dr. Francis Weld Peabody, professor of medicine in the Harvard Medical School and director of the Thorndike Memorial Laboratory of the Boston City Hospital, as a member of its board of scientific directors.

THE HONORABLE CHARLES EVANS HUGHES, formerly secretary of state, has accepted the appointment of honorary president of the American Association for Medical Progress, succeeding the late Dr. Charles W. Eliot.

AT the annual meeting of the Royal Society of Edinburgh held on October 25, Sir James Alfred Ewing, principal of the University of Edinburgh and formerly professor of engineering, was elected president.

AT the annual general meeting of the Cambridge Philosophical Society the following officers were elected for the session 1926–27: *President,* Dr. H. Lamb; *vice-presidents,* G. Udny Yule, Professor J. T. Wilson, Professor A. Hutchinson; *treasurer,* F. A. Potts; *secretaries,* F. P. White, R. H. Fowler, H. Munro Fox.

DR. BERNHARD S. STEINBERG, of the department of pathology of Western Reserve University School of Medicine and for the last year Crile Research Fellow, has been appointed director of research and laboratories at the Toledo Hospital, Toledo.

A. A. SCHAAL was recently appointed director of the scientific bureau of The Biscuit & Cracker Manufacturers Association, succeeding Dr. C. H. Bailey, who returned to the University of Minnesota.

DR. HERMAN N. BUNDESEN, commissioner of health of Chicago, has been made professorial lecturer on public health administration in the department of hygiene and bacteriology at the University of Chicago.

DR. L. E. BARNETT, emeritus professor of surgery at the University of Otago, New Zealand, visited the Mayo Foundation during the week of November 7. He was returning from a trip to England, where he attended the meeting of the British Medical Association. Dr. Barnett is president of the Australian branch of the British Medical Association.

DR. CHARLES L. CONNOR, instructor in pathology at the Harvard Medical School, has been given a leave of absence in order that he may accept a temporary position as associate professor of pathology at McGill University.

DR. ROY CHAPMAN ANDREWS, who has been in England making a formal report to the Royal Geographical Society and the Central Asia Society on his expedition into Mongolia, has returned to New York.

DR. ROY WALDO MINER has returned from an expedition to the Bahama Islands, where he secured casts of fishes to be used in connection with the Coral-reef Group for the new hall of ocean life in the American Museum of Natural History and also sketches for the backgrounds for the upper portions of the same group.

PROFESSOR A. S. HITCHCOCK, agrostologist in the U. S. Department of Agriculture and custodian of grasses in the U. S. National Museum, left on November 20 for Cuba where he will study the grasses of the island in cooperation with the Tropical Plant Research Foundation. He expects to return before Christmas.

DR. S. C. LIND, recently appointed to the directorship of the school of chemistry in the University of Minnesota, gave an address before the Wisconsin section of the American Chemical Society on "The Chemical Effects of Alpha Particles." A dinner was tendered Dr. Lind at the University Club by some twenty-five members of the section by way of welcome to his coming to the middle west.

DR. J. S. AMES, provost of the Johns Hopkins University, lectured on "The Continuity of Physical Science" before the Swarthmore College chapter of the society of the Sigma Xi on November 16.

DR. DONALD D. VAN SLYKE, of the Rockefeller Institute, gave a Mayo Foundation lecture in Rochester on the evening of November 22. His subject was, "Urea Excretion in Nephritis." On November 19 Dr. Van Slyke delivered the seventh Pasteur lecture at the Institute of Medicine of Chicago on "Certain Aspects of the Physical Chemistry of the Blood."

DR. W. J. HUMPHREYS, of the U. S. Weather Bureau, gave an illustrated lecture on "Fogs and Clouds" at St. Johns College, Annapolis, on November 23.

DR. KIRTLEY F. MATHER, professor of geology at Harvard University, spoke twice at Oberlin College on November 4. He gave a semi-popular address on "Andean Trails and Jungle Streams," and another to a large group of science students on "Some Recently Acquired Data on the Earth's Interior and their Bearing on our Fundamental Geologic Problems."

DR. GEORGE D. HUBBARD, of Oberlin College, gave three addresses in Buffalo on November 17, 18 and 19. Two were given to the freshmen of the University of Buffalo as part of their introduction course, on the subjects "Geology, a Philosophy" and "Geology, a Vocation." He also spoke under the auspices of the Sigma Xi Club on "The Physiography of the Yangtze River."

AT a meeting of the New York Electrical Society on November 24, Dr. E. R. Berry, consulting engineer of the General Electric Company, spoke on "Fused Quartz" and Dr. Alfred F. Hess, professor of clinical pediatrics at the Bellevue Medical College, on "Newer Knowledge of the Action of Ultra-Violet Rays."

DR. CHARLES G. ABBOT, director of the Astrophysical Observatory, Smithsonian Institution, gave an address on "The Smithsonian Institution" at the Boston Public Library on November 18, and addresses entitled "The Life of Research" and "The Study of Solar Radiation" at the Massachusetts Institute of Technology on November 19 and 22.

DR. W. A. TAYLOR, president and chemical director of the LaMotte Chemical Products Co., Baltimore, Md., spoke before the West Virginia School and Conference on Water Purification at Charleston, W. Va., on November 12.

PROFESSOR J. PARSONS SCHAEFFER, professor of anatomy in the Jefferson Medical College, will read a paper on "The Problem of an Individual Anatomy in Man" before the American Philosophical Society on December 3.

DR. JOHN QUINCY STEWART, professor of astronomical physics at Princeton University, will lecture before the Franklin Institute on December 9, on "Hypotheses regarding the Source of the Energy of Sun and Stars."

PROFESSOR MCKIM MARRIOTT, professor of pediatrics and dean at the Washington University School of Medicine, will deliver the annual medical lectures under the auspices of the San Diego County Medical Society during the month of January, 1927. A series of five lectures will deal with "Recent Advances in Biological Chemistry."

THE Henry Sidgwick memorial lecture was given at Newnham College, University of Cambridge, on November 13 by Sir William Bragg, who spoke on "The New Crystallography."

OHIO STATE UNIVERSITY has received from Mr. William B. Newberry, of Cleveland, Ohio, the gift of a portrait of John Strong Newberry, the second state geologist of Ohio, whose term of office was from 1869 to 1878. Dr. Newberry was the first professor of geology in Columbia College.

DR. FORRIS JEWETT MOORE, until a year ago professor of organic chemistry at the Massachusetts Institute of Technology, died on November 20, aged fifty-nine years.

WILLIAM JOHN KNOX, of New York, chemist and inventor, died on November 25 at the age of sixty-five years.

DR. ROBERT J. WILSON, formerly associate professor of bacteriology and hygiene, University and Bellevue Hospital Medical College, New York, died on October 16 at the age of sixty years.

DR. WILLIAM FRANCIS MAGRUDER, assistant professor of physiology, biochemistry and pharmacology at Harvard University, has died, aged thirty-two years.

THE annual exhibition representing the current work of the Carnegie Institution of Washington will be held in the administration building on December 10 from 8:30 to 11:00 o'clock in the evening.

WITH a view to augmenting the value of the papers and discussions during the annual meeting of the American Society of Mechanical Engineers, the committee in charge has arranged an extensive excursion schedule. Places of engineering interest not ordinarily open to the public will be visited under ideal conditions. Among the inspection trips will be the following: Kips Bay Station, New York Edison Co., December 7, 2:00 p. m.; Hudson Avenue Station, Brooklyn Edison Company, December 8, 2:00 p. m.; Holland Vehicular Tunnel, New York-New Jersey, followed by trips to Harrison Gas Plant of the Public Service Company of New Jersey, December 9, 2:00 p. m.; Hell Gate Station of the United Electric Light & Power Company, followed by a visit to the De La Vergne Machine Company, December 10, 10:00 a. m.; inspection of Diesel Electric Ferry of the Erie Railroad, plying between 23rd Street, New York, and Weehawken, N. J., also plant of the New York *Evening Post*, December 10, 2:00 p. m.

CLARK UNIVERSITY has arranged a series of lectures on "The Case for and against Psychical Research," to be held in the new auditorium at 8:15 in accordance with the following schedule: November 29, Professor Joseph Jastrow, University of Wisconsin;

November 30, Dr. L. R. G. Crandon, Boston, Mass.; December 3, Dr. Walter F. Prince, Boston Society for Psychic Research; December 4, Professor F. C. S. Schiller, Oxford University, England; December 7, Dr. Gardner Murphy, Columbia University; December 8, Mr. Frederick Bligh Bond, British Society for Psychical Research; December 9, Mrs. Margaret Deland, American novelist; December 11, Professor Hans Driesch, president, British Society for Psychical Research. Manuscripts by Sir Arthur Conan Doyle, of England, Professor William McDougall, of Harvard University, Professor John E. Coover, of Stanford University, Mrs. Mary Austin, American novelist, and others will be read.

SMITHSONIAN Radio Talks, arranged by Mr. Austin H. Clark, are being given as follows from Station WRC, Washington: December 1, at 6:45 p. m., "Early American Animals—Elephants and Others," Mr. James W. Gidley, U. S. National Museum; December 8, at 6:45 p. m., "Shooting Stars," Dr. Willard J. Fisher, Harvard College Observatory; December 15, at 6:45 p. m., "An Observatory among the Hottentots," Dr. Charles G. Abbot, assistant secretary, Smithsonian Institution.

UNIVERSITY AND EDUCATIONAL NOTES

TULANE UNIVERSITY will receive about $1,000,000 by the will of the late William Ratcliffe Irby.

FIVE gifts totaling $650,000 from members of the Vanderbilt family to be applied to the $4,000,000 building and endowment fund being raised by Vanderbilt University for the College of Arts and Sciences and the School of Engineering have been announced. An additional gift of $150,000 has been made by the General Education Board.

WESTERN RESERVE UNIVERSITY has received a grant of $975,000 from the General Education Board. The sum of $750,000 is to be used to build an institution of pathology for the school of medicine of Western Reserve and its affiliated hospitals. The board is giving the university the sum of $75,000 a year for the next three years, beginning on January 1, 1927, for the budget of the entire school of medicine. Work will start shortly on the erection of the new pathology institute. The plans call for a four-story building, a hundred and fifty-seven feet long by fifty-five feet wide. The new institution will be under the direction of the school of medicine. It will combine the work of the department of pathology of the school with the pathology of the university hospitals, focusing the whole in one spot and under Dr. Howard T. Karsner, professor of pathology at the school of medicine, who will head the institute.

GENERAL KALEVRAS, the governor-general of Greek Macedonia, on October 15 opened the new University of Salonika, of which Professor Sotiriades is the rector.

THE *Proceedings* of the Washington Academy of Sciences announce that Kirk Bryan and G. M. Hall, of the water resources branch of the U. S. Geological Survey, have left Washington to assume their new duties on the teaching staffs, respectively, of Harvard University and the University of Tennessee.

NORMAN W. KRASE, formerly of the department of chemistry at Yale University, has been appointed assistant professor in the department of applied chemistry at the University of Illinois.

AT the Harvard Medical School, Dr. William Carter Quinby has been promoted to be a clinical professor of genito-urinary surgery, and Dr. Karl M. Bowen to be assistant professor of psychiatry.

SIR THOMAS OLIVER has been elected to succeed Sir David Drummond as president of the University College of Medicine at Newcastle. Sir David Drummond has been a member of the council of the college for forty-seven years, and became president in 1918.

DR. G. VON HEVESY, professor of physical chemistry at the University of Freiburg, has been invited to succeed Professor Bodenstein in the chair of physical chemistry at the Technische Hochschule at Hannover.

DR. EGON SCHWEIDLER, professor of physics at the University of Innsbruck, has been called to the chair of physics at the University of Vienna.

DISCUSSION AND CORRESPONDENCE

WHAT IS "METAPHASE"?

THIS question has been rather pointedly brought to the attention of the writer by the discovery of the fact that until recently Rutgers students were learning one definition of the term "metaphase" down-stairs (in the zoological laboratories) and another definition up-stairs (in the botanical laboratories). A survey of over a dozen text-books of botany and of zoology shows that such diversity is bound to occur, for the term has been variously defined by different writers, and even by the same writer at different times. The chief divergence is between the view that metaphase refers essentially to the stage during which the chromosomes split, and the view that metaphase is equivalent to the equatorial plate stage. It is a matter of

common knowledge that Strasburger (Archiv mikroskop. Anat. *23*: 246–304. 1884) proposed the terms prophases, metaphases and anaphases, using each of them in the plural, and defining metaphases thus (p. 260): "Ich werde, im Gegensatz zu den Prophasen die mit der Längsspaltung der Segmente in der Kernplatte ablaufen, die Stadien vom beginnenden Auseinanderweichen der Tochtersegmente bis zur vollendeten Trennung und Umlagerung darstellend, als Metaphasen zusammenfassen." At least as late as the publication of the first edition of his *Lehrbuch* (1894), Strasburger defined the phases in the same manner, but somewhat later he shifted his ground and transferred the idea of separation of the chromosomes to the stage which he then called anaphase (singular), thus: "Das Stadium der Kernplatte ist die *Metaphase*. Das Auseinanderweichen der Tochterchromosomen erfolgt in der *Anaphase*." (Lehrbuch, neunte Auflage, 1908, p. 71.)

It is important to note that Strasburger adhered to his original definition of the prophases (or prophase) as including the longitudinal splitting, and consistently drew a sharp distinction between the splitting and the separation of chromosomes. Some more recent writers however have not hesitated to define metaphase as including the splitting, thus taking what would seem to be an unwarranted liberty, or at all events paying scant attention to the definition of the terms as proposed by their originator. Shull indeed considers that "the metaphase is a brief phase covering no more than the period of splitting of the chromosomes" (Shull, A. F., Principles of Animal Biology, 2nd edition, p. 67). If "metaphase" is taken to include the period of splitting of the chromosome, it is pertinent to inquire what becomes of "prophase," in view of the early appearance of doubling of the nuclear filament in some organisms. In spite of the unquestioned significance of the splitting in relation to biological theory, this overlapping of the defined fields of prophases and metaphases can lead to nothing but confusion in the mind of the student.

At least one writer has expressed the opinion that the question of terminology is unimportant, and probably there are many who agree with this view. But would it not be advisable to altogether discontinue the use of the terms, if we do not know what they mean when they are used? Allen (SCIENCE *64*: 138–140. 1926) suggests that we use each of the four terms in the plural, and retain the original significance of "metaphase." But such usage disregards the mature judgment of the originator of the terms, as expressed in the later writings of Strasburger. Except for the use of three of the terms in the plural, the latest edition of Wilson's classic work conforms to Strasburger's later writings, while Sharp's valuable book also conforms to Strasburger's later definition of the terms. It would accordingly appear to be in good taste for text-book writers and others to either follow this good example or else to abandon the use of the terms.

M. A. CHRYSLER

RUTGERS UNIVERSITY

THE RECEPTION OF THE "ORIGIN OF SPECIES"

MAY I add a postscript to Professor Osborn's letter of November 12?

Professor Osborn tells us that the first edition of the Origin of Species (an edition, by the way, of a thousand copies) was published on November 24, 1859, and was sold out on the day of issue. I happen to have a copy of the fifth thousand (1860) whose first owner has inscribed it February 24, 1860. Over four thousand copies had been disposed of between November 24, 1859, and February 24, 1860.

E. B. TITCHENER

PLASTICINE MODELS

"PLASTICINE models in teaching mitosis," reported in a recent number of SCIENCE by Dr. Black, of Connecticut College, was helpful and I intend to profit by her suggestion.

For several years I have constructed in class demonstration models of the metaphase and anaphase stages, using wires with the plasticine, and I have found that the students grasp the idea of the polar view much more quickly than from a flat drawing. In our course in general zoology we have each student use plasticine frequently in their study of the smaller forms, such as Paramecium, Hydra, Obelia, etc. We find it additionally helpful in understanding the cleavage process.

CATHERINE V. BEERS

DEPARTMENT OF BIOLOGY,
UNIVERSITY OF SOUTHERN CALIFORNIA

LOST X-RAY SPECTROMETER

IN the hope that we may be able to restore a piece of lost property to its owner we would greatly appreciate if you would publish the following facts.

Recently the New York Central Railroad had an auction sale of unclaimed baggage. One of the pieces of baggage contained what appears to be a simple X-ray spectrometer with a fluorescent scale for visual observation. The purchaser brought the apparatus to us for identification, and he is willing to restore it to its owner if we can locate him.

The instrument was sent as baggage on the New York Central Railroad from Albany, N. Y., to Chicago, where it arrived at 10 A. M. on October 21,

1924, presumably on the Twentieth Century Limited. The date makes it appear possible that the apparatus may have belonged to someone who attended the meeting of the British Association for the Advancement of Science in Toronto. The instrument was manufactured by Schall & Son, of London.

Inquiries should be directed to the undersigned who will take the necessary steps to have the instrument returned to its owner.

PAUL E. KLOPSTEG

CENTRAL SCIENTIFIC CO.,
CHICAGO, ILL.

SCIENTIFIC BOOKS

Applied Entomology—an Introductory Text-Book of Insects in their Relations to Man. By H. T. FERNALD, Ph.D. New York, McGraw-Hill Book Co., 1926, 395 pp., 388 illustrations. [Second edition.]

THE first edition of Dr. Fernald's excellent introductory text-book was published in 1921, and has been used extensively by teachers of applied entomology. There has been much progress in applied entomology in the last five years, and a text-book must keep up with the times. The result has been that, while a revision was probably desirable three years ago, it has become a necessity after five years.

It has been the obvious attempt of the author and publishers to confine the volume to about the same size, and the new edition covers only ten pages more than the first edition, and no new illustrations have been added to the 388 of the first edition. Three hundred and eighty-eight illustrations for a book of 382 text pages is a large number, but this is a subject that not only lends itself to illustration but demands illustrations. A good figure is better than three pages of description. These illustrations have been derived from all possible sources, perhaps the majority of them having been borrowed from previous publications of one kind or another; but, as Dr. Fernald says in his introduction, "Where satisfactory illustrations are already available it is questionable whether new ones are any gain, particularly when all are new to the student." While approving strongly of practically all of the illustrations used, the writer of this review regrets that in the five years since the first edition was published Dr. Fernald did not find time to substitute one of his own excellent photographs for the figure of a Tachinid fly, as published on page 329. The average student will instantly in his mind compare this figure to a house fly crushed on a window pane. Perhaps in his next edition he will accept this friendly suggestion from one of his friends and admirers.

The arrangement of the material of the book is that which is generally adopted in courses of study or lectures in most of the colleges in the country; that is to say, it follows in the main the classification of the insects rather than the classification of crops affected and other human interests. There is, for example, no grouping of the injurious Lepidopterous larvae of a certain crop, like apples, but the apple caterpillars will be found in their proper systematic place in the chapter on the Lepidoptera. In the same way the Diptera that affect human beings are found in their proper taxonomic families, and not in a chapter on medical entomology. This arrangement is quite different to that in Professor Herrick's book reviewed by the writer in SCIENCE of May 21, last. It is for the teachers themselves to say which is the best method. The writer, never having been a teacher, is not competent to judge.

In this new edition the Hymenoptera have been rearranged in accordance with more recent classificatory views, and a short chapter has been added on "Animals not insects, with which the entomologist is expected to deal." This chapter covers only five pages, and the new edition as a whole is, as we have stated, only ten pages longer than the original edition.

As a matter of fact, it is almost as impossible to keep a text-book up to date with the progress of economic entomology as it is to keep up with the year to year spread of imported pests. A text-book writer must do the best he can under these circumstances, and if his publishers will not allow him to prepare a revised edition every six months, or at least once a year, the text-book is bound to be always a little bit behind the time. But then the teacher can refer his students to the latest state or government bulletin or leaflet, and so relieve himself of the possible criticism that he does not know everything that is to be known about his subject. Dr. Fernald himself is an up-to-date man and a thoroughly good teacher. He was in his earlier days more broadly trained in zoology and general biology than most of the present teachers of entomology. He was associated for many years at the Massachusetts Agricultural College with his father, the late Charles Henry Fernald, an inspiring teacher. Between them the Fernalds have trained many of the strongest of the workers in applied entomology of to-day.

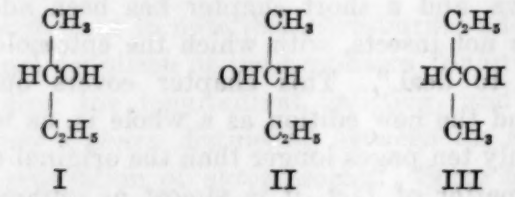
The entomologists accept with respect everything that comes from the present author, and doubtless this new edition of his text-book of applied entomology will not only be found to be widely useful, but the publishers will remain in a contented frame of mind and will back him up by issuing the frequent revisions which will doubtless be necessary on account of the rapid march of our fight against injurious insects.

L. O. HOWARD

SPECIAL ARTICLES

THE CONFIGURATIONAL RELATIONSHIP OF DEXTRO-METHYLETHYL CARBINOL TO DEXTRO-LACTIC ACID[1]

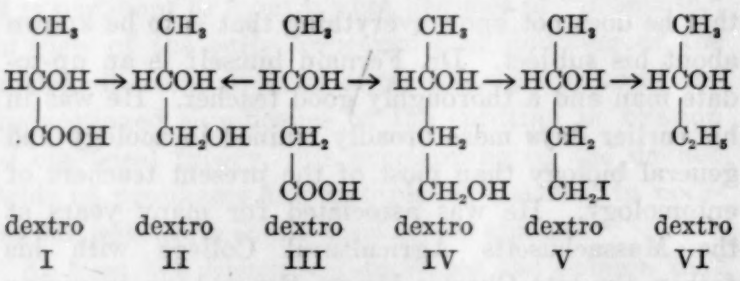
THE configurations of aliphatic substances containing in their molecules several secondary alcoholic groups, or one or more secondary alcoholic groups in addition to a polar radicle as $-COOH$, $-CHO$, or $=C=O$, have been correlated to a single reference substance: lactic acid. Nothing is known, however, regarding the stereochemical relationships of simple secondary alcohols to the same substance of reference, nor is there any definite knowledge as to the stereochemical relationships of individual secondary alcohols among themselves. The case of secondary alcohols is complicated by the following fact. The first member of the series is



I II III

methylethyl carbinol (I). Its enantiomorph (II) may be represented also as ethylmethyl carbinol (III). A question has been raised as to whether or not the higher homologues of the "methyl" and "ethyl" series should rotate in opposite directions as their first members do.

Dextro-methylethyl carbinol and dextro-lactic acid have now been correlated by the following set of reactions:



dextro I, dextro II, dextro III, dextro IV, dextro V, dextro VI

The reactions leading to the correlations of (I) to (IV) were described in previous communications by Levene and Haller and Levene and Walti. Thus dextro-methylethyl carbinol belongs to the *l* series of hydroxyacids, inasmuch as dextro lactic acid belongs to the *l* series.

P. A. LEVENE
A. WALTI
H. L. HALLER

[1] From the laboratories of The Rockefeller Institute for Medical Research, New York.

ELECTRICAL ACTIVATION OF THE NEREIS EGG

UNFERTILIZED starfish eggs will develop to larval stages after the passage of strong constant currents, but the effect is mainly due to the heat which accompanies the high current densities employed.[1] There is, however, a partial activation by strong currents at temperatures below those which cause heat-activation.

Experiments on the electrical activation of the eggs of *Nereis limbata* were made during the summers of 1925 and 1926 at the Marine Biological Laboratory. Fifty-three experiments, involving 839 dishes of eggs, form the basis of this report.

The same apparatus was used as in the experiments with the starfish eggs. A diagrammatic cross-section of the electrode system is shown in the figure. The bridges, which consisted of agar jelly of about 4 per cent. concentration, were constructed from agar agar which was allowed to solidify after having been liquefied by heat in fresh sea water.

These bridges, having low resistance, conduct currents of high density without becoming unduly heated, and form a type of non-polarizable electrodes having wide application in experiments where it is desired to pass the electric current through cells or tissues immersed in salt solutions.

The electrical circuit consisted of two slide wire rheostats connected in series with the 120-volt direct current supply of the laboratory. A secondary circuit was obtained by taking leads from these rheostats which served as a potential divider; a reversing switch, a milliammeter and the electrode system were connected in series with this second circuit.

The physical conditions were so adjusted that the desired current density was obtained. A female Nereis was then placed in the layer of sea water between the two bridges of agar, and the electrical circuit was closed. As a result of the enforced muscular contraction, the eggs were almost instantaneously ejected through a rupture in the body wall. At known intervals during the flow of the current (every five or ten seconds in the case of currents of high density) several hundred eggs were transferred with a pipette to a Syracuse watch-glass containing fresh sea water. These watch-glasses were then covered and set aside.

The percentages of eggs forming jelly and fertilization membranes and the percentages developing to an actively motile larval stage after about twenty hours were determined. Current densities of from 61 to 606 milliamperes per square centimeter of sectional area

[1] Lillie, R. S., and W. Cattell, *Biol. Bull.*, 1925, Vol. XLIX, No. 2, p. 100.

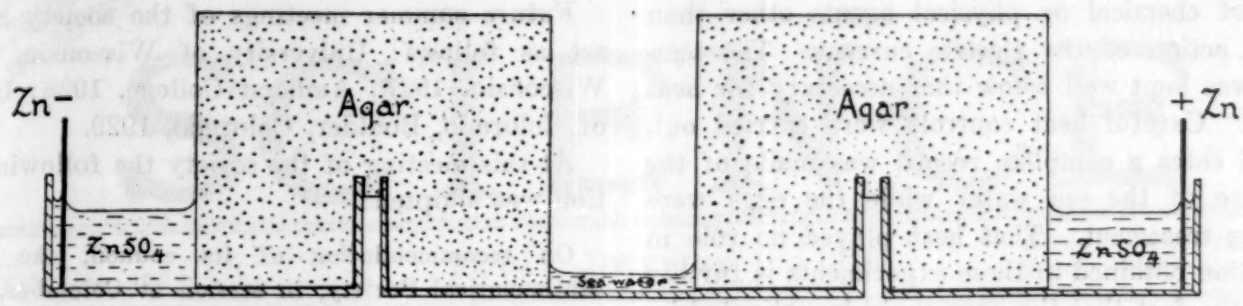


FIG. 1

of the sea-water were used. Little or no activation was obtained when the current density fell outside the range of 125–210 ma./cm.² A variation of 12 per cent. from the optimum duration of exposure was found to decrease greatly the resulting proportion of swimming larvae, sometimes preventing their formation. It seems probable that if the ideal current intensity and time of exposure were accurately determined a more complete activation might result than any so far obtained. This is indicated by the very considerable variation in the yield of swimming forms in cases where the variation in experimental conditions was slight. Brief exposures (10 to 20 seconds) to currents of high density, *e.g.*, 500 ma./cm.², cause complete cytolysis.

Passage of currents in the manner indicated caused activation in most eggs when the intensity and duration of the current were appropriate. The degree of activation varied according to the conditions, and was most complete in those cases where the eggs were exposed to current densities of about 150 ma./cm.² for a period of 70 to 90 seconds.[2] This treatment resulted consistently in the formation of jelly and fertilization membranes in practically all eggs. Of these a certain variable proportion, usually three to ten per cent., formed swimming larvae.

In one instance more than one quarter of the eggs became actively motile. Many eggs actually reached an early larval stage, but did not exhibit definite ciliary movement. For this reason the recorded percentage of "swimmers" is probably considerably lower than the actual percentage of eggs that reached an equivalent developmental stage.

There is a well-defined optimum in regard to both the current intensity and the duration of exposure. There is also a relation between the strength of current and the optimal duration of exposure; in general, the greater the current density, the shorter the exposure required to bring about the same degree of activation.

In most cases the cleavage or fragmentations were irregular and the resulting larvae were abnormal. At times, however, both cleavages and larvae resulted which were so nearly perfect as to be indistinguishable by external examination from the normal forms. A large amount of this material has been preserved and the forthcoming cytological study will, it is hoped, determine the precise degree to which the cleavage and development differ from the normal.

Typically, when the circuit is closed the worm sheds the larger part of its eggs almost instantaneously, but some eggs remain within the body cavity. A slight variation from the regular procedure in a few of the later experiments is worthy of note. After an exposure of from two to four minutes to the usual range of current densities the worm was removed and very thoroughly washed in running sea water. It was then placed in a finger bowl of fresh sea water. After this treatment the worm soon recovered and began swimming. About two hours later the remaining eggs were shed. Many of these were found to have formed jelly and membranes, and in one case five per cent. of the eggs reached the swimming larval stage. The eggs had thus received their activating stimulus while still within the body cavity.

The amount of activation obtained was considerably greater when the intact worm was first placed in position between the electrodes and the circuit then closed, than when the eggs were first shed into a finger bowl of sea water and an interval was allowed to elapse before exposing them to the current. This difference indicates that the susceptibility of the eggs to electrical activation is decreased as a result of simple contact with, or washing in, sea water. In this respect the results with electrical parthenogenesis agree with the observations of Lillie[3] on Arbacia and of Just[4] on Nereis, where also it was found that washing the eggs in sea water lowered their susceptibility to artificial activation, as well as to sperm fertilization.

The fact that the eggs can be activated *in vivo* obviates the possibility of accidental exposure to the

[2] Just (*Biol. Bull.*, 1915, Vol. XXVIII, No. 1, p. 1) found that the length of exposure most favorable for heat activation in the Nereis egg was about twenty-five minutes when exposed to sea-water warmed to 32–35° C. At the same time he found that the optimal exposure for activation by a solution composed of 20 per cent. 2.5 M. KCl in sea-water was about fifty minutes.

[3] Lillie, F. R., SCIENCE, 1912, Vol. XXXVI, p. 527.

[4] *Loc. cit.*